

PROCEEDINGS
OF THE
ZOOLOGICAL SOCIETY
OF LONDON.

PART XVI.

1848.

PRINTED FOR THE SOCIETY;
SOLD AT THEIR HOUSE IN HANOVER SQUARE,
AND BY MESSRS. LONGMAN, BROWN, GREEN, AND LONGMANS,
PATERNOSTER ROW.



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ERRATA.

Page 140, line 13, for *Rachedian* read *Rachidian*.

„ 140, „ 15, „ *Rachal* read *Rachial*.

„ 141, „ 25, „ *Llama* read *Bisulca*.



PROCEEDINGS
OF THE
ZOOLOGICAL SOCIETY OF LONDON.

January 11, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following communications were read:—

1. ON THE REMAINS OF THE GIGANTIC AND PRESUMED EXTINCT WINGLESS OR TERRESTRIAL BIRDS OF NEW ZEALAND (*DINORNIS* AND *PALAPTERYX*), WITH INDICATIONS OF TWO OTHER GENERA (*NOTORNIS* AND *NESTOR*). BY PROFESSOR OWEN, F.R.S. ETC. ETC.

In this memoir (No. III.) Professor Owen confined himself to the description and comparison of the bones of the head and beak, forming part of a very extensive and valuable series collected by Mr. Walter Mantell in a deposit of volcanic sand at Waingongoro, North Island of New Zealand. After enumerating the principal bones, now in the possession of Dr. Gideon Mantell, F.R.S., by whom Prof. Owen had been kindly invited to determine and describe them, and stating the species to which the majority were referable, viz. *Dinornis giganteus*, *D. casuarinus*, *D. didiformis*, *D. curtus*, *Palapteryx ingens*, *P. dromioides*, *P. geranoides*, the author alluded to a form of tarso-metatarsal bone, which had supported a strong back-toe, and resembled the metatarsus of the Dodo, but was shorter and thicker, as apparently belonging to the tibia of the species described in a former memoir (Zool. Trans. iii. 1843, p. 247), to the *Dinornis otidiformis*, but which must belong to a genus (*Apterornis*) distinct from both *Dinornis* and *Palapteryx*. He also stated that the collection contained many bones of seals of the genus *Arctocephalus*, F. Cuv., with a few bones of a dog and of the human subject: the latter had been calcined, and were probably the remains of some cannibal feast of the natives. The uncalcined bones of the seal were in the same state, brittle, absorbent, and of a yellowish brown colour, as the bones of the extinct birds, with which they were associated and appear to have been

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coeval. Numerous fragments of the shells of more than one kind of egg, the largest surpassing in size the egg of the ostrich, had also been discovered with the bones.

In the present memoir Prof. Owen described the bones of the head and beak. They belonged to four distinct genera of Birds. The largest skull, with a very strong, broad, subelongate and subincurved beak, like an adze, was referred to the genus *Dinornis*. The second in size, with a beak to which that of the Emeu makes the nearest approach, was referred to *Palapteryx*. The third skull, with a beak like that of the *Porphyrio* and *Brachypteryx*, was referred to the same family—'*Rallidæ*'—to which those genera belong; but, through the peculiarities of the cranium, formed the type of a new genus, *Notornis*. The fourth form of beak was referable to the genus *Nestor* in the family *Psittacidæ*.

The cranium of the *Dinornis* presents the family characters of great breadth, and forward inclination of the occipital region, of the vertical plane of the occipital foramen, and of the prominent and pedunculate occipital condyle; but the downward development of the basi-occipital and basisphenoid is exaggerated, as compared with the *Palapteryx*, the basis cranii, which is $2\frac{1}{2}$ inches in length, descending abruptly for the extent of 1 inch below the foramen magnum; the condyle is hemispherical as in *Otis*, not a quarter of a sphere as in *Struthio* and *Palapteryx*, nor, as in *Didus*, a transverse reniform tubercle with a median notch above. The foramen magnum is a vertical ellipse, with lateral processes encroaching upon it, as in *Didus*; but in this large extinct bird the upper half of the foramen is narrower and almost pointed above. In *Apteryx* and *Palapteryx* the foramen is widest transversely. The margin of the foramen magnum is broad and excavated in both *Dinornis*, *Otis* and *Didus*, but the upper border ends in the latter genus in a tubercle on each side.

In *Didus* there is a small middle supraoccipital foramen and two lateral ones, but these do not exist in *Dinornis*, *Otis*, or *Palapteryx*: the lateral foramina are present in *Apteryx*.

In the extinct genera and in *Otis* the supraoccipital ridge is well-marked, but defined rather by the subsidence of the occipital surface than the elevation of the ridge above the parietal one.

In no bird is the extent of surface for muscular attachment so great at the back part of the head, or so strongly marked by depressions and ridges, as in the *Dinornis*.

The extension of the surface by the downward thick wedge-shaped development of the basi-occipito-sphenoidal surface, and by its lateral strong backwardly produced ridges, is quite peculiar to the *Dinornis*. An approach to this structure is made by *Otis* in the ridges that connect the sides of the flat basisphenoid* with the paroccipital* processes. In *Palapteryx* the basi-sphenoid is square and flat below, in *Didus* it presents a longitudinal channel bounded by parallel lateral ridges; the sides of the basisphenoid, which incline to these ridges,

* For the definition of these and other anatomical terms the author referred to his 'Report on the Homologies of the Vertebrate Skeleton' in "Report of British Association, 1846."

are slightly concave, have two perforations posteriorly, one above and a little in advance of the other, and form the anterior and internal boundary of the tympanic cavity.

In *Palapteryx*, as in *Didus*, the basioccipital descends and expands into two thick obtuse processes, from which muscles pass to the inwardly-bent angles of the jaw. Internal to these processes are two short tubercles. On each side the base of the occipital condyle in *Dinornis* are three small foramina; in *Didus* two, the outer one the largest.

In *Dinornis*, *Otis* and *Didus*, two foramina, the upper one for the hypoglossal nerve, the lower one for the entocarotid artery, open externally in a deep elliptic depression. The paroccipital is enormously developed in *Dinornis*, and sends a rough thick process from its under part to abut against the lateral basioccipital ridge, where it articulates and sometimes anchyloses with the stylohyal: in *Palapteryx* and *Didus* the paroccipital carries the posterior surface of the skull downwards and outwards in a minor degree than in *Dinornis*, and terminates in a curved convex thick border: its internal surface next the tympanic cavity is cellular in *Didus*. The eustachian outlets open, in both *Dinornis* and *Otis*, above a transverse ridge terminating the basisphenoid anteriorly: this ridge is not present in *Apteryx* or *Palapteryx*. The *Palapteryx* also differs from *Dinornis* in the higher position of the precondyloid holes and their greater separation from the carotid holes, in the minor development of the paroccipitals, the major development of the mastoids, and by the large and single oblong depression, beneath the mastoid, for the single superior condyle of the tympanic bone. In *Dinornis* the temporal fossa is wide and deep, in *Didus* narrow and deep; the alisphenoid is concave where it ascends to coalesce with the mastoid, parietal and post-frontal to form the temporal fossa: the limits of the orbitosphenoid are also obliterated by a similar confluence: in this region of the skull the 'foramen ovale' is preceded in *Dinornis* as in *Didus* by two smaller foramina, and in front of these is the great 'foramen opticum.' The parietals are very broad and short in both extinct genera; but in *Dinornis* there is a median rising where the sagittal suture originally ran, whilst *Didus* shows a depression and foramen here. The mastoid in *Dinornis*, as in *Otis*, sends down two processes, one, the tympanic process, short,—the other, or proper mastoid process, long; this coalesces with the postfrontal in *Dinornis*, not in *Otis*: the base of the mastoid has two articular cavities for the upper condyles of the tympanic bone. In *Didus* the outer side of the mastoid is convex, smooth, but with a slight oblique ridge; it overhangs the tympanic cavity, bending inwards, and sends a short compressed pointed mastoid process in front of the anterior articular cavity for the anterior and upper condyle of the tympanic.

The presphenoid is a deep compressed plate, thickened and rounded below; the palatines abut against it, as in *Didus*, where the fore-part of the pterygoids also rest in part upon the presphenoid. The frontals of *Dinornis* form together a broad hexagonal plate moderately convex, with the cerebral hemispheres indicated by very

slight risings: the postfrontals form the depressed lateral angles; the anterior border is emarginate and coalesces with the nasals and premaxillary, without being elevated above them. In *Palapteryx* the frontals are more produced anteriorly before coalescing with the base of the beak. In *Otis* the interorbital part of the frontals is deeply and widely excavated. In *Didus* the frontals are broad and convex, rising singularly above the cranial ends of the nasals and premaxillary, with which they also coalesce. The supraorbital plate presents a rough notch near the fore-part, where in *Dinornis* there is a shallow emargination. In *Dinornis* there is a shallow depression with vascular grooves at the outside of the base of the postfrontal distinct from the temporal fossa: in *Didus* the temporal fossa extends forwards above the postfrontal and forms there a reniform depression, either for a gland, or what is less likely, for a co-extension of the origin of the temporal muscle. The postfrontal is a strong triangular obtuse process, ending freely as in *Palapteryx*, not joined to the mastoid as in *Dinornis*. The orbitosphenoids, indicated by the optic foramina, continue the roof and septum of the orbits by coalescence with the alisphenoids behind, the frontals above, the prefrontals in front, and the presphenoid below: they send a ridge upwards and outwards to the under part of the postfrontals, but do not present that singularly swollen character which is so peculiar in *Didus*; in which also the prefrontals form a large smooth protuberance, like a tumour, at the fore-part of the orbits, and appear on the upper surface of the cranium in front of the antorbital process of the true frontal and external to the lachrymal. The interorbital bony septum is entire in both *Dinornis* and *Didus*; but in the latter it is more than an inch in thickness and cellular, and in this respect more resembles the singular structure of the part in *Apteryx*. The orbits are smaller in *Dinornis* than in the large existing *Struthionidae* or in *Otis*, but are larger than in *Apteryx*. The olfactory chambers in *Dinornis* are less developed than in *Palapteryx* and *Apteryx*.

The nasal bones in *Dinornis* and *Otis* converge where they overlap the prefrontal (*ethmoide*, Cuv.) in order to join the frontal and include that end of the nasal process of the premaxillary, which is on a lower plane; and, as they advance, they pass beneath that process, coalesce with it and with each other, and terminate in *Dinornis* in a point. In *Didus* the nasals also anchylose with the frontal, where they are separated by the nasal process of the premaxillary, as indicated by the two longitudinal fissures, which, commencing behind at 2 lines distance from the outer border of the anchylosed base of the beak, gain that border at 1 inch 9 lines distance from the frontal, and thus indicate the proportions of the base formed by the anchylosed nasals: the fissure can also be traced as in *Dinornis*, bending inwards upon the under surface of the nasal process of premaxillary, to about 3 inches from the frontal, when the fissure returns back, inclining to the median line, and meets its fellow there. All the outer part of the median stem or base of the beak defined by these linear furrows I regard as the nasals, which thus support the nasal process of the premaxillary.

This process is a broad transversely arched plate, where it joins the maxillary processes to form the anterior or rostral part of the premaxillary; the extent of which, anterior to the external nostrils, is $2\frac{1}{2}$ inches, the whole length of the premaxillary being $4\frac{1}{2}$ inches. Its breadth at the middle is rather more than an inch; the depth of the upper bony beak gradually decreases from its base where it is 1 inch 9 lines, to its apex where it is less than 1 line, but retains a breadth of 8 lines, the edge appearing to have been truncate or very slightly rounded off: the whole upper beak being gently arched to this terminal edge resembles the cooper's adze (*doloire*, Fr.). The palatal surface is broad, very slightly excavated, and bounded laterally by well-defined alveolar ridges: the palatal nostril commences anteriorly 1 inch 10 lines from the anterior border of the premaxillary. In *Didus* the nasal process of the premaxillary presents an elliptic transverse section where it quits the maxillary processes, and diminishes in depth as it retrogrades, becoming depressed and broad where it rests upon and divides the nasals to ankylose with the frontal. Where the nasal and maxillary processes diverge, there is a deep groove externally terminating in a canal directed forwards into the rostral part or body of the premaxillary; this part is subincurved, pointed, rough and with irregular vascular perforations, with a sharp inferior border on each side, and a more concave palatal surface than in *Dinornis*. The long and slender palatines of *Dinornis* coalesce behind with the vomer and in front with the maxillaries; they are concave below, particularly at their back part, by the downward extension there of their inner border. In *Didus* the palatines arch outwards from their posterior attachments, are broad and smooth mesially with a sharp crenate edge above; a thin, outwardly smooth, convex ridge is directed outwards and downwards, and a more angular ridge is directed downwards with an obtuse apex: a groove divides this from the outer ridge: the upper and outer ridge extends to the maxillary; the lower ridge subsides before it reaches the maxillary. The palatines form the boundaries of the naso-palatine aperture, and approximate each other at both their ends, but do not meet. There is a fossa at the outer and near the back part of each palatine, where there is a rough concavity; the rest of the outer surface is convex lengthwise, concave vertically. The boundaries of the maxillary are more readily traceable in *Didus* than in *Dinornis*; but they have coalesced in both, with the palatine, malar and lachrymal behind, and with the maxillary process of the premaxillary in front: the maxillary in *Didus* forms a compressed longitudinal plate of bone with thick rounded borders above and below, and almost touches its fellow, leaving a deep narrow chink between the nasal fossa above and the palate below, closed by the palatal membrane.

The tympanic bone of the *Dinornis* has more a triangular than a quadrate form by reason of the unusually large size of its inferior condyle, which forms its base: the orbital process is a compressed subrhomboidal plate: the lower condyle is not so extended inferiorly in the Bustard (*Otis*); its upper condyle is bifid, as in *Dinornis*. In

Palapteryx it is single, as in *Apteryx*. In *Didus* the tympanic bone is subquadrate with the four angles produced, and the upper and hinder one bifurcate, forming the bifid condyle for the mastoid articulation: in *Dinornis* the mastoid condyle is also double, with a linear strip of bone between; and behind this the pneumatic foramen, where also similar foramina are situated in *Didus*: in this extinct bird, the orbital process, forming the anterior angle, is compressed and truncate: the outer surface of the bone is smooth and convex vertically; the inner surface is traversed by a sharp concave ridge extending from the inner division of the upper condyle to the anterior part of the inner and lower angle: the anterior division of the inner surface is concave, the posterior one is concave vertically, convex transversely. The antero-posterior extent of the condyle for the lower jaw is little, but greatest at its outer part, where it rests upon the shallow reniform outer division of the concave articular part of the lower jaw: the inner, more ridge-like part of the condyle sinks into a deeper transversely extended depression of the same articular concavity. The tympanic of the *Dinornis* chiefly differs in the great extension, upwards and backwards, of the broad and undivided inferior condyle: there is also an articular surface, on its outer side, for the mastoid process (not present in *Otis*) and another small one on the inner side for the pterygoid; besides the lower and outer cup for the end of the slender zygoma (squamosal).

The inner angle of the expanded articular end of the lower jaw of *Dinornis* ends by a short obtuse process. In *Otis* and *Didus* it forms a strong trihedral process, the anterior and posterior facets meeting a transverse ridge below, which is continued into a compressed plate forming the posterior angle of the jaw. The posterior surface is smooth and slightly concave, semioval in *Dinornis*, deeper and subtriangular in *Didus*.

The outer part of the articular end of the mandible is smooth and convex in *Dinornis*: in *Didus* a masseteric ridge is continued downwards and forwards from the outer overhanging border of the articular cavity to the back and lower angle of the dentary piece, defining, with the posterior border of the dentary, a concave, slightly pitted surface. The surangular in *Dinornis* has a short and low thick coronoid ridge, external to which there is a rough oval surface. In *Didus* the surangular develops a very small coronoid process, and its fore-part is deeply notched: a deeper and more angular notch divides the surangular from the angular piece. This notch receives the lower fork of the dentary on the outside, and the end of the splenial at the inner side. These notches do not exist in *Dinornis*: the surangular, angular and articular pieces have coalesced together in both the extinct birds. Where they join the posterior forks of the dentary piece, a long narrow vacuity is left, which in *Dinornis* is almost divided by a broad bar of bone extending upwards from the angular, but which does not quite touch the surangular. In *Didus* the upper fork of the dentary joins the upper and fore part of the surangular; the notch between the hinder forks of the dentary bounds anteriorly the narrow elliptic vacuity, 15 millimeters long by 3 milli-

meters deep. A notch also extends forwards, and divides outwardly the symphysial from the ramal part of the dentary: this notch or hole does not exist in *Dinornis*.

The parts of the bones of the beak referred to *Palapteryx* consist of the anterior end of the premaxillary and of the symphysis and part of both rami of the mandible. The premaxillary, by the proximity of the external nostrils to its apex, and by the nasal grooves continued thither on each side from the anterior boundary of the nostrils, resembles that of the large existing *Struthionidæ*, and the Emeu more especially by the slenderness of the nasal process of the premaxillary and the angle at which it rises from the broad and flat maxillary processes. The end of the beak was, however, more obtuse than in the Emeu, and the short symphysis of the lower jaw is more deeply excavated above: it presents, however, the two parallel longitudinal grooves on its under part, as in the Emeu and Ostrich. The lower jaw appears from the remains of one ramus to have been 5 inches or $5\frac{1}{2}$ inches in length, and to have been broader and deeper than in the Ostrich or Emeu: and the cranium by its greater breadth behind, its less depth, its vertical foramen magnum and prominent occipital condyle, the lower position of the basisphenoidal platform, and the marked angle which it forms with the almost vertical basioccipital, concurs with the beak in establishing the generic distinction of the great bird to which it belonged. As the characters which were adduced in a former memoir (Zool. Trans. iii. p. 327) to separate those bones of the extremities that by their more slender proportions approximated the *Struthionidæ* and, by the indication of a small back-toe, the *Apteryx* more particularly, from other bones of corresponding size but more robust proportions and devoid of a back-toe,—led to the former being assigned to the genus *Palapteryx*, and the latter to *Dinornis* proper;—so the characters which, in the first of the skulls described in the present memoir, show a departure from the struthious type, and in the second skull an approach thereto, clearly indicate the propriety of assigning the one to the genus *Dinornis* and the other to the genus *Palapteryx*. The total length of the skull referred to *Palapteryx geranoïdes* is 6 inches at least; the breadth of the cranium $2\frac{1}{2}$ inches: the bird probably equalled the Emeu in size.

The skull which indicates the third genus of apparently extinct bird (*Notornis*) measures $4\frac{1}{2}$ inches in length, and the cranium is 1 inch 8 lines in breadth. The bones of the beak closely resemble in form and structure those of the Purple Coot (*Porphyrio*), but the occiput is relatively broader, and more inclined forwards as it ascends: the plane of the occipital condyle is vertical, and the basioccipital extends further below the occipital condyle, though less so than in *Palapteryx*. In these characters the *Brachypteryx* or Short-winged Rail of New Zealand more resembles *Notornis*. The articular surface of the tympanic is divided, as in *Dinornis* and *Otis*, into two subcircular cups. The parietal region is singularly flat, the temporal fossæ unusually long, well-defined by ridges extending from the paroccipital to the postfrontal. In the comparatively small *Porphyrio* and *Bra-*

chhypteryx, in which, as in all small birds, the cerebral hemispheres, as requiring a certain bulk for their functions, do not decrease in the ratio of the size of the body, the upper surface of the cranium is raised by the hemispheres beneath into a smooth convexity.

The *Notornis* is a large modified form of the same natural family of the *Grallæ* as the *Porphyrio* and *Brachypteryx*, and from the form of its sternum it must have been, like the latter peculiar bird of New Zealand, deprived of the power of flight.

The fourth genus of bird indicated by portions of the skull in Mr. Walter Mantell's collection was referable to the family of Parrots (*Psittacidae*), and amongst these to the genus *Nestor*. The bony portion of the upper beak—the only part of the skull preserved—by its deep, subcompressed, curved and pointed form, its seeming solidity, pierced by small subcircular nostrils close to its base, attested the family character; whilst the proportional length as compared with the depth, the narrow upper surface to where it suddenly expands above the nostrils to join the cranium, the absence of the notch on the under border, the very narrow elongated triangular palatal surface, with the median linear notch at its base,—all demonstrate that in this characteristic part of the skull the New Zealand bird represented by it most resembled the genus *Nestor*,—a singular nocturnal Parrot at present only known as a denizen of that island.

Thus then it appears that the indications of two genera, with several species of terrestrial birds of large or gigantic size, deduced in the Author's former Memoir (Part II.) from bones of the legs, are most fully and satisfactorily confirmed by the evidence of the subsequently received bones of the head and beak.

The form and structure of these characteristic parts in one of the genera (*Dinornis*) are so peculiar, that the author does not refer the genus to any known natural family of birds. Its location in the order *Struthionidæ* implies little more than an arrested development of wings, and an exaggerated development of legs, organized for progression on dry land.

As, however, there are strictly aquatic forms of birds deprived, by a low development and special modification of the wings, of the power of flight, so also there are, in other natural groups of birds, aberrant forms similarly debarred from the privilege and enjoyment of the characteristic kind and field of locomotion of their class. Apart from the true *Struthionidæ*, we have an instance of this in the *Brachypteryx* or modified Rail of New Zealand; the Dodo is a second instance, whether it be regarded as an aberrant Vulture or a modified Pigeon, according to the views entertained by Mr. Gould and supported, with new arguments, by Mr. Strickland, before the British Association at Oxford, and which will be fully elucidated in the forthcoming work on the extinct flightless birds of the Mauritius and neighbouring isles, which Mr. Strickland is about to publish in conjunction with Dr. Melville.

With regard to the natural group or family of birds to which the *Dinornis*, with its adze-like bill and crocodiloid cranium, may be referable, the author pointed out several marks of resemblance in the

skeleton of the Bustard to the *Dinornis*, which are not presented by the skeletons of the true *Struthionidæ*. But he also dwelt upon the peculiar characters of the *Dinornis*, distinguishing it from the *Otidæ*, and indicating it to form a distinct family-type in the order of *Grallæ*.

With regard to the peculiar form of beak in *Dinornis*, reference was made to the deductions in the former memoirs, "from the unusual strength of the neck," that the *Dinornis* would be found to have a beak applicable "to a more laborious task than the mere plucking of seeds, fruits or herbage;" and that "the robust proportions of the cervical vertebræ, especially of their spinous processes, may have been the foundation of those forces by which the beak was associated with the feet in the labour of dislodging the farinaceous roots of the ferns that grow in characteristic abundance in New Zealand."

For this labour the beak of the *Dinornis*, formed after the model of the adze or pick-axe, seems peculiarly adapted, and the singular development in both breadth and depth of the occipital part of the cranium, with its strongly marked ridges, processes and muscular depressions, is precisely calculated for the adequate attachment of the muscular masses arising from the cervical vertebræ.

The second form of cranium and beak, referred to the genus *Palapteryx*, indicates that genus to be a member of the true *Struthionidæ*, and by its affinities to have been intermediate between *Dromaius* and *Apteryx*.

The *Notornis* is a struthious or brevipennate form of the *Rallidæ*, intermediate between *Porphyrio* and *Brachypteryx*. The remains of the beaks of the Psittaceous bird are not distinguishable generically from those of the genus *Nestor* of New Zealand.

Thus, observed Prof. Owen, "those concordances in the geographical distribution of existing and recently extinct forms of the warm-blooded vertebrate classes which are illustrated by the remains of Elephants, Rhinoceroses, Hippopotamuses, Hyænas, large Bovines and Cervines, in the pleistocene deposits of Asia and Europe,—by the absence of these and the presence of gigantic extinct Sloths, Armadillos and Anteaters, in the coeval deposits of South America, and of huge fossil Kangaroos, Wombats and Dasyures in the bone-caves and freshwater deposits of Australia,—have received new and striking elucidations from the repeated discovery, in the cavernous fissures, turbaries, and river-beds of New Zealand, of the remains of gigantic forms of birds allied to those small species, *Apteryx* and *Brachypteryx*, which constituted the highest representatives of the warm-blooded classes in the island, until the advent of Man led to the introduction of its present terrestrial mammals."

The author in conclusion repeated his acknowledgments to Dr. Mantell for the prompt accordance of the privilege of examining and describing these rare and interesting remains and expressed his high-sense of the scientific value of the labours by which that eminent geologist's intelligent and enterprising son, Mr. Walter Man-

tell, had made so great an addition to the materials for developing the natural history of New Zealand.

The memoir was accompanied with numerous drawings of the specimens described, which will form plates 52—56 of the third volume of the 'Transactions.'

On the conclusion of Professor Owen's communication, Dr. Mantell expressed his opinion, that although the specimens formerly sent to this country were obtained from the beds of rivers and mountain-streams, and were regarded by the gentlemen who collected them as of very recent date, in reality they belonged to a period of as high antiquity, in relation to the surface-soil of New Zealand, as the diluvium containing bones of the Irish Elk, Mammoth, &c. to that of England. He observed that Mr. Colenso, Mr. Taylor, and Mr. Williams, who sent to England the bones figured and described by Professor Owen in the 'Zoological Transactions,' vol. iii., agree in this remarkable fact, that in some places, where the loamy marl in which their specimens were found was observed *in situ*, it was covered by several feet of strata of marine and freshwater sand, gravel and silt. The bones collected by Mr. Walter Mantell, among which were the crania and mandibles that formed the subject of Professor Owen's present communication, were all found imbedded in a loose pure sand, formed in a great measure of magnetic iron and minute crystals of augite and hornblende, the detritus of volcanic rocks. This sand has filled all the cavities and cancelli of the bones, but is not in any instance consolidated together: hence the bones are in the most beautiful state of preservation, and the most delicate processes entire. Dr. Mantell conceives that this bed of volcanic sand is a continuation of the deposit of sandy loam which occurs at the embouchures of the rivers along the west and east coasts of the North Island, in the localities that yielded the bones sent over by Mr. Williams and Mr. Taylor; and that in the higher regions of the same river-valleys, the detritus brought down by the mountain-streams from the volcanic chain whence they originate, is unmixed with the clay and silt of the lower alluvial tracts; for all the streams in these parts of the North Island rise from the lofty ridges of Mount Egmont and Tongariro. Dr. Mantell alluded to the fact, that along the sea-coasts and on the banks of the rivers Eritonga, Waibo, &c., there are horizontal terraces of boulders of trap-rocks fifty feet high; and that the small rocky islands of trachyte off the coast bear marks of wave-action to the height of 100 feet above the present sea-level. He mentioned other facts of a like nature in confirmation of his opinion, that since the Moas existed the surface of the country has been elevated many feet above the level of the sea, and that the present rivers and mountain-streams are flowing through channels cut into the ossiferous deposits; in like manner as the rivers of Auvergne flow through the newer tertiary marls and limestones containing bones of Mammalia, and those of England through the diluvial clay and loam in which

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are imbedded the remains of the large extinct Pachyderms, the Rhinoceros, Mammoth, &c. He deemed it probable that the last of the race of Moas were destroyed by the earliest inhabitants of New Zealand, as the Dodo was finally extirpated by the Dutch colonists of the Mauritius, and the Irish Elk by the early British or Celtic tribes; but he considered it evident that the bone-deposit was in the progress of accumulation ages ere man inhabited the country.

2. DRAFTS FOR A NEW ARRANGEMENT OF THE TROCHILIDÆ. BY JOHN GOULD, F.R.S. L.S. Z.S. ETC. (CONTINUED FROM PART XV.).

Genus HELIANTHEA.

Gen. char.—*Rostrum* longum, rectum vel sursum aliquantò tendens, cylindraceum. *Nares* basales, et plumis a rostri basi porrectis, obtectæ. *Alæ* mediocres, et validæ. *Cauda* mediocris, et occlusa, paululùm furcata. *Pedes* perparvi. *Tarsi* admodùm breves, et plumis induti. *Hallux* brevissimus.

Bill long, straight or inclining upwards, and cylindrical; nostrils basal and covered with the feathers advancing from the base of the bill; wings moderately long and powerful; tail of medium size and slightly forked when closed; feet very small; tarsi extremely short, and clothed with feathers; hind-toe the shortest.

Types, *Trochilus helianthea* and *Bonapartii*.

Remark.—Plumage of the males rich and beautiful in the extreme.

Hab. So far as is yet known, the Cordillerian Andes.

HELIANTHEA EOS (n. sp.), Aves, t. i. *Hel. mas, summo capite nigro, apud frontem notâ metallicè aureo-viridi; collo anteriore et pectore splendide aureo-viridibus; gutture centrali notam intensè cæruleam ferente.*

Male.—Crown of the head black, with a shining spot of metallic golden green on the forehead; fore-part of the neck and chest lustrous golden green, the golden green predominating on the lower part of the chest; on the centre of the throat a patch of rich deep blue; abdomen rich shining flame-colour; back, wing and upper tail-coverts bronzy orange; tail cinnamon-brown, the apical half of the two middle feathers and the tips of the remainder with a bronzy lustre; primaries chocolate-brown; secondaries reddish buff, forming a conspicuous mark on the wing.

Female.—Similar in colour, but much less resplendent, and entirely destitute of the spot of green on the forehead and the patch of blue on the throat.

Total length $5\frac{1}{4}$ inches; bill $1\frac{1}{2}$; wing $2\frac{3}{4}$; tail 2; tarsi $\frac{3}{16}$.

Hab. The highlands of New Grenada and Venezuela.

Remark.—Nearly allied to *H. Bonapartii*.

Genus AGLÆACTIS.

Gen. char.—*Rostrum* sub-breve, paululùm apud basin depressum, rectum. *Nares* basales. *Alæ* elongatæ, validæ; remigibus primariis falciformibus hac formâ præcipuè apud primam pennam

notandâ. *Cauda* mediocris, et occlusa, paululùm furcata. *Pedes* validi et robusti. *Tarsi* in partem plumis induti. *Hallux* cum ungue, digito medio cum ungue longior.

Gen. char.—Bill rather short, a little depressed at the base and straight; nostrils basal; wings long and powerful; primaries, particularly the outer one, sickle-shaped; tail moderately large and slightly forked when closed; feet strong and powerful; tarsi partially clothed with feathers; hind-toe and nail longer than the middle toe and nail.

Types, *Trochilus cupripennis* and *T. Pamela*.

AGLÆACTIS CAUMATONOTUS (n. sp.). *Ag. vertice et collo fuscis, loris, pectore, et partibus inferioribus cinnamomeis; gula fasciâ nigro-fuscâ trans-notatâ; lateribus nigro-fusco tinctis; plumarum penicillo elongatâ, et intensè fusco, sed ad apicem fulvo, apud pectus imum; alis æneo-olivaceis; caudâ cinnamomeâ, supernè æneo-olivaceâ; dorso caudæque tectricibus purpurascanti-liliaceis si plumæ contra lucem modo contrario in conspectu sint.*

Crown of the head brown; lores, chest and under-surface cinnamon-brown; throat crossed by a bar of blackish brown; flanks clouded with blackish brown; from the lower part of the chest springs a tuft of lengthened feathers, which are dark brown at the base and buff at the tip; wings bronzy olive; tail cinnamon-brown, except on the upper or exposed portion, which is rich bronzy olive; back and upper tail-coverts shining purplish lilac, which colour is only seen when the feathers are looked at in the reverse direction.

Total length $4\frac{1}{2}$ inches; bill $\frac{7}{8}$; wing $3\frac{1}{4}$; tail $1\frac{3}{4}$; tarsi $\frac{3}{8}$.

Hab. Peru.

Remark.—Closely allied to *T. cupripennis*.

Genus HELIANGELUS.

Gen. char.—*Rostrum* rectum, æquè ac caput longum, cylindraceum, et ad basin aliquantò depressum. *Plumæ frontales* rostri basin non obtegentes. *Alæ* mediocriter validæ primariâ externâ falci-formi. *Pedes* mediocriter validi, halluce digitum intermedium æquante. *Cauda* mediocris, subrotundata.

Gen. char.—Bill straight, about as long as the head, cylindrical, and slightly depressed at the base; feathers of the forehead not advancing upon the bill; wings somewhat powerful, outer primary sickle-shaped; feet moderately strong; hind-toe and nail the same length as the middle toe and nail; tail rather round in form and of medium size.

All the species of this genus are from the Andes, and distinguished by the extreme lustre of the throat, which in most of the species is bounded below by a gorget of white or buff.

Types, *Trochilus Clarisse*, *Spencei*, *amethysticollis*, and *strophianus*.

HELIANGELUS MAVORS (n. sp.), Aves, t. ii. *Hel. mas, fronte notam angustam intensè flammeam ferente, vertice corporeque superiore æneo-viridibus; gula intensè flammæ, lunulâ latâ fulvâ, subtù*

circumscripta, abdomine intensius fulvo, lateribus viridi lavatis; crisso griseo-fulvo; alis purpurascenti-fuscis; caudæ rectricibus intermediis duabus æneo-viridibus reliquis æneo-fuscis, externis duabus ad apicem obscure albis; tarsis intense fuscis; rostro nigro-fusco.

Male.—Crown of the head and all the upper surface bronzy green, except the forehead, on which is a narrow mark of deep fiery red; throat deep fiery red, bounded below by a broad crescent-shaped mark of buff, which colour, but of a somewhat deeper tint, pervades the whole of the abdomen, except the flanks, which are washed with green; under tail-coverts greyish buff; wings purplish brown; two middle tail-feathers bronzy green, the remainder bronzy brown, the two outer ones on each side obscurely tipped with white; tarsi dark brown; bill blackish brown.

Total length $3\frac{7}{8}$ inches; bill $\frac{3}{4}$; wing $2\frac{1}{2}$; tail $1\frac{5}{8}$; tarsi $\frac{1}{4}$.

Hab. The Cordilleras of Venezuela and New Grenada.

Genus THALURANIA.

Gen. char.—Rostrum capite longius, deorsum curvatum, et paululum apud basin depressum. Alæ breves, debiles. Cauda mediocris, furcata. Tarsi plumis induti, parvis, mollibus. Hallux cum ungue, digito intermedio cum ungue brevior.

Gen. char.—Bill longer than the head, curved downwards, and rather depressed at the base; wings short and feeble; tail moderately large and forked; tarsi clothed with feathers, small and delicate; hind-toe and nail shorter than the middle toe and nail.

Types, *Trochilus furcatus*, *nigro-fasciatus*, *Watertonii*, &c.

THALURANIA VIRIDIPECTUS (n. sp.). *Thal. corpore superiore æneo-viridi, hoc colore in viridissimum vergente apud uropygium; rectricibus caudæ crissoque necnon caudâ metallicè cæruleo-nigrescentibus; alis purpurascenti-nigris; gutture et pectore splendide viridibus; abdomine fulgentè cæruleo; tarsis plumis albis indutis; rostro nigro.*

All the upper surface bronzy green, passing into bright grass-green on the lower part of the back; upper and under tail-coverts and tail steel bluish black; wings purplish black; throat and chest resplendent grass-green; abdomen bright blue; tarsi clothed with white feathers; bill black.

Total length $4\frac{1}{4}$ inches; bill 1; wing, $2\frac{1}{4}$; tail $1\frac{3}{4}$.

Hab. The Columbian Andes.

Remark.—Nearly allied to *Trochilus nigrofasciatus*.

CAMPYLOPTERUS OBSCURUS (n. sp.). *Camp. vertice, corpore superiore, rectricibusque caudæ quatuor intermediis viridibus; gulâ, partibusque inferioribus intense griseis; lateribus crissoque viridi lavatis; rectricibus caudæ externis utrinque nigris, duabus externis ad apicem griseis.*

Crown of the head, all the upper surface and the four middle tail-feathers green; throat and under surface dark grey; flanks and under

tail-coverts washed with green; the three lateral tail-feathers on each side black, the two outer ones tipped with grey.

Total length $5\frac{1}{4}$ inches; bill $1\frac{1}{8}$; wing 3; tail 2.

Hab. River Amazon.

Remark.—Nearly allied to, but quite distinct from, *Campylopterus latipennis*.

TROCHILUS (—?) **CALIGATUS.** *Troch. vertice, et corpore superiore viridibus, gula et corpore inferiore splendide viridissimis; alis purpurascenti-nigris; caudæ tectricibus et caudâ nitide metallico-cæruleis; crissi plumis eodem coloratis, albo fimbriatis; femoribus tarsisque plumis niveis indutis.*

Crown of the head and upper surface green; throat and all the under surface resplendent grass-green; wings purplish black; upper tail-coverts and tail bright steel-blue; under tail-coverts the same, fringed with white; thighs and tarsi clothed with snow-white feathers.

Total length $3\frac{1}{2}$ inches; bill $\frac{7}{8}$; wing $2\frac{1}{8}$; tail $1\frac{3}{8}$.

Hab. New Granada.

Remark.—Nearly allied to *Trochilus Saucerotii* and *T. erythronotus*.

Genus OXYPOGON.

Gen. char.—*Rostrum capite brevius, debile et rectum. Genæ supra subtusque rostrum plumis elongatis ornatae; illis supra erectis, his subtus pendentibus. Alæ paululò longæ. Cauda ampla et occlusa, furcata. Pedes ampli et validi. Tarsi nudi. Hallux cum ungue longior digito, cum ungue intermedio.*

Gen. char.—Bill shorter than the head, feeble and straight; face both above and below the bill ornamented with lengthened plumes, the former erect, the latter pendent; wings rather long; tail large, and forked when closed; feet large and strong; tarsi bare of feathers; hind-toe and nail longer than the middle toe and nail.

Types, *Trochilus Guerinii* and *T. Lindenii*.

3. ON FASTIGIELLA, A NEW GENUS OF SHELLS OF THE LAMARCKIAN FAMILY CANALIFERA. BY LOVELL REEVE, ESQ.

The shell which I am about to describe, from the collection of Hugh Cuming, Esq., is of an entirely new form, differing generically as well as specifically from any of the class to which it belongs. It is of an elongated turreted growth, and may be said to partake in almost equal proportions of the characters of two genera somewhat removed from each other in the system, *Turritella* and *Cerithium*. As in *Turritella*, the shell is of a solid spirally-ribbed structure, without any indication of varices, a condition not to be found in *Cerithium*; whilst it possesses a character which excludes it from the family *Turbinacea*, in having a short umbilicated twisted canal, different from that of *Cerithium*, for the passage of an elevated fold of the mantle. At the base the shell is not much unlike some species of *Buccinum*, but it is remarkable for its elongated *Turritella*-like growth.

It is, moreover, to all appearance the production of a carnivorous gasteropod, and more strictly referable to the Canaliferous tribe than the *Cerithia*, which, according to Deshayes, are vegetable-feeders, and partake in many instances of the freshwater habits of the *Melania*.

Unfortunately Mr. Cuming is not in possession of any information respecting the shell, either as touching the animal or its place of habitation, and it only remains to add the following description, with the hope that the attention of conchologists will be directed to a form which appears new and of much interest.

Class GASTEROPODA.

Order PECTINIBRANCHIATA.

Family CANALIFERA.

Genus FASTIGIELLA.

Testa elongato-turrita, basi contracta et umbilicata, aperturâ parvâ, canaliculatâ, canali brevissimo, subcontorto.

FASTIGIELLA CARINATA. *Fast. testâ lanceolatâ, anfractibus rotundatis, carinis tribus, earum interstitiis nitidè excavatis, spiraliter cingulatis; extus intusque albâ.*

Hab. — ? Long. $1\frac{3}{4}$ in.; lat. $\frac{5}{8}$ in.

On the characters of this species it may be remarked that there are ten forcibly developed keels to a whorl, all of which are concealed from the observer by the superposition of one whorl upon another excepting three, these being the most distant from each other.



January 25, 1848.

Dr. Gamble in the Chair.

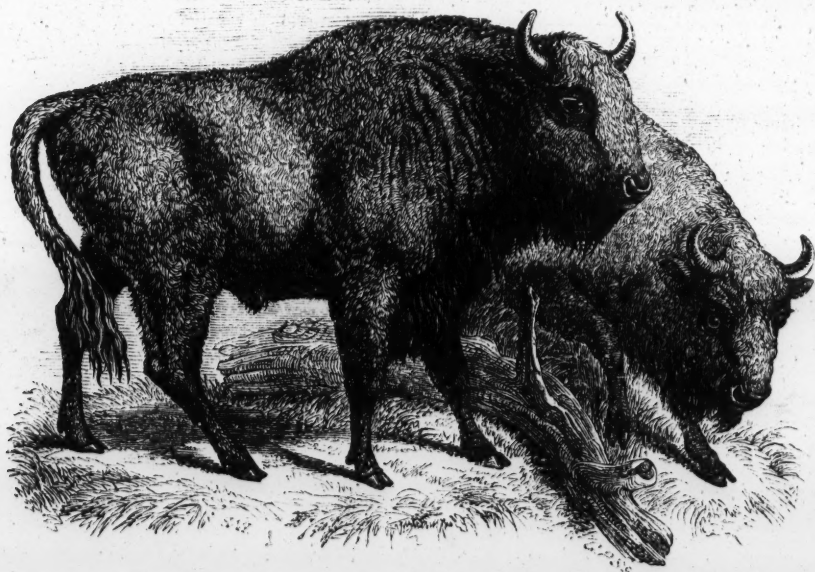
The following papers were read:—

1. NOTE ON THE CAPTURE OF THE AUROCHS (*Bos Urus*, Bodd). BY M. DIMITRI DE DOLMATOFF, MASTER OF THE IMPERIAL FORESTS IN THE GOVERNMENT OF GRODNO.

(Communicated by Sir Roderick Murchison.)

Après avoir été nommé en 1842, maître des forêts du Gouvernement de Grodno, je me suis empressé, autant par devoir que par goût pour ma vacation, de porter une attention particulière sur la forêt de Bialowieza, ce dernier asile du Bison de l'Europe, et j'ai fait la description de cette forêt primitive et de son hôte intéressant, dignes tous les deux d'être cités au nombre des curiosités, qu'offre notre belle et immense patrie. Mon ouvrage fut accueilli favorablement par notre Gouvernement, mais depuis cinq années d'observations et de recherches assidues m'ont convaincu que cet ouvrage est incomplet; et ont fait naître en moi le désir de rédiger un traité sur le Bison; car mes propres expériences, renferment des faits curieux, et exempt de toute erreur.

Je me suis attaché particulièrement à combattre par des expériences l'opinion erronée, accréditée par tous les écrivains qui ont traité cette matière, nommément comme quoi le veau du bison ne pouvait être



alaité par nos vaches domestiques. Cette fable se trouve répétée même dans l'ouvrage d'un écrivain estimé de notre temps, le Baron de Brinvers, qui s'étayant du récit d'un autre écrivain, le savant Gilbert, prétend que deux veaux femelles de Bison attrapées dans la forêt de Bialowieza et âgés de sept semaines, refusèrent constamment la mamelle d'une vache domestique; qu'ils consentirent il est vrai, de teter une chèvre, mais aussitôt rassasiées repoussaient leur nourrice avec mépris, et devenaient furieuses toutes les fois que l'on voulait les approcher d'une vache domestique. M. de Brinvers n'a pas eu la possibilité de vérifier par lui-même ce fait: et s'en est rapporté avec traditions, qui lui sont parvenus par les anciens des environs; parceque si quelqu'un des gardes forestières ou des paysans qui habitent la forêt, avait même rencontré un veau de Bison, isolé par quelque accident de sa mère, il l'aurait plutôt laissé, que de s'en emparer et de l'alaiter en contravention de la loi sévère, qui défend de se saisir d'un Bison ou de le tuer. Ce n'est donc que l'ordre suprême de sa Majesté l'Empereur, émané en suite du desir de sa Majesté la Reine Victoire de posséder dans son Parc Zoologique deux bisons vivans, qui m'a mis à même de rectifier l'erreur ci-dessus mentionnée. Car comme plusieurs essais constataient déjà, que des Bisons saisis dans l'âge mûre et leur état sauvage, ne pouvaient jamais supporter la captivité et surtout le transport, et périssaient infailliblement, j'ai proposé d'attraper deux jeunes veaux, et de les alaiter près des maisons des gardes forestières. Son Excellence M. le Ministre des Domaines de l'Empire Comte de Kisseleff ayant approuvé cet projet et ordonné de la mettre en exécution, je me rendis sans délai à la forêt de Bialowieza. Ce fut le 20 Juillet 1846 à l'aube du jour et assisté par 300 traqueurs et 80 chasseurs de cette forêt, armés de fusils, chargés simplement de poudre, que nous nous mîmes sur la trace d'un troupeau de Bisons exploré pendant la nuit.

La journée était superbe, le ciel serein, il n'y avait pas un souffle de vent, et rien n'interrompait le calme de la nature si imposant sous le dôme majestueux de la forêt primitive. Les 300 Traqueurs, soutenus par 50 Chasseurs, avaient cerné dans la plus profonde silence la vallée solitaire où se trouvait le troupeau des Bisons. Quant à moi, accompagné de 30 Chasseurs de plus déterminés et de la mérite, nous pénétrâmes à pas de loup dans l'enceinte cernée, avançant avec la plus grande précaution, et retenant, pour ainsi dire, notre haleine. Arrivés à la lisière qui bordait la vallée, nous jouîmes d'un tableau des plus intéressants! Le troupeau des Bisons était couché ruminant sur la pente d'un coteau, dans la plus parfaite sécurité, tandis que les veaux fôlâtraient autour du troupeau, s'amusaient à s'entr'attaquer, à frapper la terre de leurs pieds agiles, et à faire voler le sable en l'air, puis ils s'enfuyaient vers leurs mères respectives, se frottaient contre elles, les léchaient et revenaient en suite à leurs jeux. Mais au premier son du cor le tableau changea en un clin-d'œil! Le troupeau, comme frappé d'un baguette magique, bondit sur ses pieds et sembla concentrer toutes ses facultés en deux sens, celui de l'ouïe et de la vue. Les veaux se pressèrent timidement contre leurs mères. Puis quand retentirent les hurlemens de la meute les Bisons

hâtèrent de se mettre en l'ordre qu'ils prennent ordinairement dans des pareilles circonstances, c'est qu'en placant leurs veaux en avant ils forment l'arrière-garde pour les garantir de la poursuite des chiens, et se portèrent en avant. Arrivés à la ligne occupée par les Traqueurs et les Chasseurs, ils furent reçus par des cris perçans et des détonations de fusil. Alors se changea l'ordre de défense ; les vieux Bisons se jetèrent avec furie à côté, y rompirent la ligne de chasse, et victorieux ils continuèrent leur course, en bondissant, et en dédaignant de s'occuper de leurs ennemis qui étaient blottis contre les arbres énormes. Cependant les Chasseurs avaient réussi à détacher deux veaux de Bison. L'un d'eux âgé de 3 mois fut prit d'un coup ; l'autre de 15 mois, quoique saisi par 8 traqueurs, les renversa et s'enfuit. On mit la meute à ses trousses, et forcé dans un marais, le Bison fut lié et transporté dans le cour du forestier. Quatre veaux de Bisons, 1 mâle et 3 femelles, furent pris dans d'autres endroits de la forêt. Une de ces femelles âgée seulement de quelques jours, fut allaitée d'abord par une vache domestique de couleur fauve semblable à celle du bison, et, ce qui surprit tout le monde, la vache témoigna un tendre attachement à cet enfant adoptif, sauvage et barbu. Malheureusement, le jeune animal mourut 6 jours plus tard, suffoqué par une enflure à la gorge, qu'il avait déjà quand on l'eût pris, et qui allait toujours en grossissant. Les autres veaux ne prirent aucune nourriture le premier jour de leur captivité ; mais le lendemain celui qui était 3 mois, se mit à teter une vache et paraissait gai. Ses compagnons de captivité excepté celui qui avait 15 mois commencèrent d'abord à prendre le lait de la main de l'homme, puis ils se mirent à boire de seau avec beaucoup d'avidité, et une fois le seau vide, ils se léchaient mutuellement le museau. En peu de tems ils perdirent leur regard sauvage, et leur timidité se changea en une vivacité et une pétulance extrême. Quand on les faisait sortir de leur étable, dans la cour assez vaste de la métairie, la rapidité de leurs mouvemens, leur agilité et la légèreté de leurs sauts, semblables à ceux du chevreuil ou du cerf, étonnaient tout le monde. Ils jouaient volontiers avec les veaux des vaches domestiques, luttaient avec eux, et quoique plus forts, ils paraissaient leur céder par générosité. Le Bison mâle de 15 mois conserva long-tems son regard morne et sauvage ; il s'irritait à l'approche de l'homme, branlait la tête, brandissait la queue, et présentait les cornes. Après deux mois de captivité il finit par l'appriivoiser, et s'attachait au paysan qui le nourrissait ; et alors on lui donna plus de liberté. Les Bisons aiment en général à frapper de leurs pieds la terre, de la jeter en l'air, et puis de s'y vouter comme le font les chevaux. Ils témoignent beaucoup d'attachement à celui qui les soigne et les nourrit, viennent se frotter contre lui, léchant ses mains, et obéissans à sa voix, ils accourent en bondissant, quand il les appelle. Toutes les fois qu'on les fait faire sortir de l'étable, ils s'animaient, levaient la tête avec fierté, dilataient leurs narines, ébrouaient avec force, et s'abandonnaient à toute sorte de jeux ; mais bientôt apercevant qu'ils sont enfermés, ils tournaient leurs regards tantôt vers la forêt immense, tantôt vers le tapis de verdure qui se déployait devant eux dans le lointain, ils semblaient

se souvenir de leur liberté sauvage, et tête baissée et avec une inexplicable tristesse ils rentraient dans leur étable.

Six veaux de Bisons, pris l'année dernière pendant la chasse que je viens de décrire, furent élevés en deux endroits, assez distans l'un de l'autre. Les deux mâles attrapés pendant la première chasse ne souffraient aucunement de la nouvelle nourriture que l'on leur offrait ; les autres, qui buvaient le lait au lieu de le teter, eurent la diarrhée pendant une semaine. Mais il est probable que ce mal ne provenait de ce que le lait, dont ils se nourrissaient, était apporté d'assez loin et aigrissait pendant le transport ; car aussitôt que l'on eut fait l'acquisition de deux vaches pour chaque Bison, et qu'ils reçurent du lait tiède et fraîchement trait, la maladie cessa. Les deux premiers s'habituèrent aussi à lécher le sel, tandis que les autres n'y touchaient jamais. Quant au jeune Bison, âgé de 15 mois, il ne voulut pas de lait et commença dès le premier jour à manger de l'avoine mêlé de paille hachée, du foin de la forêt et des prairies, de l'écorce et des feuilles du frêne, du poirier sauvage, du charme, du tremble, du tilleul et d'autres jeunes arbrisseaux. La même nourriture servit aux autres jeunes Bisons, quand on cessa de leur donner du lait. Ils s'abreuvent d'eau de puits et de rivière sans distinction, et boivent d'avantage et à plusieurs reprises par jour pendant l'été. Les jeunes veaux refusaient de prime abord se désaltérer avec de l'eau pure, et l'on fut obligé de blanchir l'eau avec un peu de lait. La faim et la soif leur font pousser une espèce de grognement semblable à celui du porc. Une nourriture abondante et diversifiée, une étable qui pendant l'hiver les garantit contre le froid et en été contre les insectes, exercèrent une influence remarquable sur la croissance du jeune Bison, à tel point, qu'une jeune femelle, saisie au mois de Janvier de cette année et destinée à remplacer une pièce, qui périt, fut trouvée de moitié plus petite que ses compagnons du même âge pris de l'année passée et soignés de la main de l'homme. Et comme l'histoire nous apprend, qu'il arrivait de tuer des Bisons d'une grandeur énorme, et que dans leur état sauvage ils sont de tailles différentes, il serait intéressant de connaître à quelles dimensions pourrait atteindre un Bison apprivoisé, nourri, et soigné par la main de l'homme ; surtout en Angleterre, où l'art d'élever les animaux domestiques est porté au plus haut degré de perfection. Une autre expérience plus importante encore, serait celle d'essayer à accoupler un taureau Bison avec une vache domestique, et je suis porté à croire la chose possible après les vellétés d'accouplement manifestées par le jeune taureau Bison pris l'année passée et âgé maintenant de 2 ans et 3 mois, qui se rue volontiers sur le veau femelle avec l'intention d'accouplement. Peut-être parviendrait on ainsi à obtenir une nouvelle race bovine croisée, qui, joignant une force et une agilité extraordinaires à la docilité et l'attachement à l'homme, pourrait lui devenir d'une grande utilité. Enfin prenant en considération qu'une paire de jeunes Bisons apprivoisés est destinée pour Londres, la seconde pour St. Pétersbourg, et la troisième à rester ici, sur leur sol natal, il serait non moins intéressant de se communiquer réciproquement et en son tems les observations comparatives qui auront été

faites sur l'influence climatique exercée sur ces animaux dans les différentes régions, où ils se trouveront transplantés.

Les Bisons apprivoisés transportés de Bialowieza à Grodno, viennent de faire par terre un trajet de 140 verstes (20 lieux d'Allemagne). La paire destinée pour St. Pétersbourg a été enfermée dans une cage couverte paillassée et oblongue, partagée en deux compartiments de manière que les Bisons pouvaient se coucher, sans se détourner l'un de l'autre. Cette nouvelle prison et les cahots du char firent une impression pénible sur l'humeur des Bisons, et quoique tranquilles et résignés, ils ne prirent pas de nourriture, ni voulurent se coucher pendant les premières 24 heures ; mais le second jour ils se calmèrent et revinrent à leurs anciennes habitudes. Le voyage dura 3 jours.

Le mâle et la femelle destinés pour Londres firent le trajet dans une cage beaucoup spacieuse et découverte. Le mâle fut fort inquiet pendant tout le voyage, se débattait sans cesse, poussait des rugissements semblables au beuglement du taureau, et se blessa à l'œil en essayant de sauter par-dessus la barrière de la cage, haute de deux toises. Agés maintenant de 15 mois le mâle a 4 pieds 1 pouce de hauteur et 5 pieds 6 pouces de longueur ; la femelle 4 pieds de hauteur et 5 pieds 3 pouces de longueur.

A Grodno les Bisons sont placés dans une étable spacieuse, et chaque paire est séparée de l'autre. Au commencement, quand on essaya de les réunir, ils se livraient à des combats acharnés à tel point, qu'ils étaient parvenus à abattre la cloison solide qui les séparait ; ils ont commencés par s'entr'attaquer, et puis, ce qui est un fait singulier, les trois Bisons mâles se sont jetés sur la seule femelle qui se trouvait à leur portée, et l'auraient tuée infailliblement, si les gardiens n'avaient pas pris sa défense. Plus tard ils s'habituerent l'un à l'autre, et les combats cessèrent.

Il faudrait selon mon avis tenir les Bisons dans un parc spacieux, où ils auraient la faculté de vivre à leur aise ; et comme ils détestaient les couleurs tranchantes, et que surtout la couleur rouge les met en fureur, leurs gardiens devraient être tenus à porter des habits d'une couleur foncée. Je crois devoir encore mentionner que les Bisons n'aiment pas les chiens et s'acharnent à leur poursuite.

DIMITRI DE DOLMATOFF,

Maître des forêts du Gouvernement de Grodno.

Grodno,
le 24 Juillet 1847.
6 Août

2. ON A NEW SPECIES OF PARROT. BY G. R. GRAY, ESQ., F.L.S.
ETC. ETC.

(Aves, pl. 3.)

I have compared the drawing of a Parrot now living in Lord Derby's collection at Knowsley with all the descriptions and figures of the different known species, but have not succeeded in meeting with one to which it can be referred. I am however somewhat doubtful whether the bird represented belongs to the genus *Platycercus*, or to *Coracopsis* ; I have given the preference to the latter,



leaving it to those who may have a better opportunity of examining the specimen than I had, while it was in London in the summer of 1847, to decide this question; and I feel that it is even possible that it may prove to be the type of a new form altogether. I propose to characterize it provisionally as

CORACOPSIS? PERSONATA.

Sp. Ch.—*Smaragdina*; *fronte, periophthalmis mandibularumque basi atris*; *pectore abdomineque medio aurantiacis, hoc saturatiore*; *remigibus reetricibusque cyaneo-nigris*.

The habitat of this fine bird is supposed to be New Guinea. It appears to be about fifteen inches in length.

February 8, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

Three communications were made to the Meeting:—

1. DESCRIPTION OF A NEW SPECIES OF GALIDICTIS FROM MADAGASCAR. BY JOHN EDWARD GRAY, ESQ., F.R.S. ETC. ETC.

(Mamm. pl. 1.)

Geoffroy St. Hilaire, in the manuscript catalogue of the Mammalia in the Paris collections, notices a specimen from Madagascar which had been collected by M. Sonnerat, which he described in the following manner, under the name of *Mustela striata*: "Supra saturatè fusca; striis quinque longitudinalibus angustis parallelis albis; gastræo pallidè canescente, caudâ basi fuscâ, reliquâ albâ; statura *Mustelæ vulgaris*."—*Fischer, Syn.* 224.

M. Cuvier in the 'Règne Animal' (ed. 2^{de}. 144) described the same specimen under the name of "La Belette rayée de Madagascar, *Putorius striatus*, Cuvier, de la taille de la belette d'Europe, d'un brun roussâtre avec cinq lignes longitudinales blanchâtres; de dessous et presque toute la queue blanchâtre."

M. Isidore Geoffroy St. Hilaire, in the notes to a paper on some Madagascar animals in M. Guérin's *Magasin de Zoologie* for 1839, p. 32, informs us that the specimen above described then existed in the collection, and that he had convinced himself that it was a young specimen of an animal rather more than two feet long, which had been sent to the Museum in 1834 by M. Goudot, under the name of *Vonsire blanc*, and called *Vontsira foutche* by the Medecasses; and he gives a description and figures of the animal and its skull, t. 18, 19, forming for it a genus which he names *Galidictis*.

A few months ago the Museum purchased of Mr. Tucker of the Quadrant an animal from Madagascar, which is evidently nearly allied to the *Galidictis striata*, but differs from it in some particulars, which

induce me to regard it as a second species of that genus. I may remark that it agrees with all the characters assigned to that genus by M. Isidore Geoffroy, except that the soles of the hind-feet are more naked than he described those of his genus *Galidia* to be, though he observes that *Galidictis* has the feet "presque entièrement semblable" to that genus; for the naked part is nearly as broad as the foot, almost to the top of the heel. The chief difference between the Museum specimen and that described and figured by the two Geoffroys and Cuvier is in the colour of the tail, and I might think this depended on age, if the elder Geoffroy and Cuvier did not describe the young animal as being of the size of a weasel, and the younger Geoffroy the adult as having the same peculiarity, viz. a white tail; while our specimen has the tail the same colour as the back, and even more distinctly variegated with black and white. The stripes are narrower, rather differently placed, and more equal in width than in the description and figure above quoted, and they do not extend so far up the neck towards the head. I propose to designate the species

GALIDICTIS VITTATA.

Grey, black and white grizzled; back and sides eight nearly equal, parallel, narrow, black-brown streaks; chin and beneath pale brown; hind-feet and outer sides of fore-legs reddish brown. Tail subcylindrical, bushy, black and grey grizzled, white towards the ends; hairs elongate, brownish white, with two (rarely three) broad black rings.

Hab. Madagascar. British Museum.

Length of body and head (when stuffed) 14 inches; tail 12 inches.

The skull, which shows that the animal was not quite full-grown, agrees in all the particulars with that figured by M. I. Geoffroy, t. 19, but is about one-fourth smaller in all its parts, and it has one more very small roundish false grinder on each side in front of the other (between it and the canines) in the upper jaw, which is not noticed in M. Geoffroy's figure nor description, and which probably falls out when the animal arrives at adult age.

Dr. T. R. H. Thomson, Surgeon R.N., who had one of these animals for six months on board ship, says it was procured at Tulyah Bay, Madagascar. It was at first extremely timid, but soon became tame and acquainted with the different parts of the vessel, and very partial to those who bestowed any attentions on it. It was remarkably agile, keeping its long bushy tail somewhat erect in running about, and uttering a sort of chirp not unlike a rat. Its chief food was uncooked meat, but it preferred raw eggs above all other articles when they could be procured. Its method of breaking them was not a little amusing: on receiving one it would roll it towards a projecting timber or gun-slide; then, lying down on its side, the little creature would grasp the egg with all its feet and throw it by a sudden jerk, repeating the attempt until the contents were obtained. Turtles' eggs being so soft and rich were always eagerly sought by it. It was very irascible while feeding, and would attack those who interfered with it at such a time, although at others it delighted in being fondled, and would play like a kitten with those it knew. The



habits of this interesting animal were not nocturnal. It died from convulsions, under which it had suffered for five weeks.

Its mode of breaking the egg is somewhat different from that of *Herpestes fasciatus*, which Dr. Thomson had also under observation for some time. This latter, after getting the egg close to a projecting object, seizes it with the two anterior feet, and then jerks it through between the hinder legs, which are raised somewhat to let the egg pass.

2. DESCRIPTION OF A NEW GENUS OF INSECTIVOROUS MAMMALIA,
OR TALPIDÆ, FROM BORNEO. BY JOHN EDWARD GRAY, Esq.,
F.R.S. ETC.

(Mamm. pl. 2.)

Mr. Low brought with him from Borneo some mammalia and reptiles in spirits; amongst them, he informed me, was "a rat-like animal with a pennated tail, which he caught in the Rajah's house at Sarawak." On examining the collection, I was much pleased at discovering in the animal so characteristically described, a new genus of Insectivora, nearly related to *Tupaia*, but differing from it both in the conformation of its tail and the form of the skull, and adding another genus to the subfamily of *Tupaina*, the geographic range of which appears to be confined to the Asiatic islands. Borneo may be regarded their more proper home, as possessing all the genera, viz. *Tupaia*, *Hylomys*, and the one under consideration, which, from the form of its tail, may be called *Ptilocercus*.

The true *Tupaia* have a broad hairy tail like the squirrels; the *Hylomys* have a very short, slender, cylindrical tail, covered with short close adpressed hair; and the *Ptilocercus*, on the other hand, have an elongated cylindrical tail, covered with rings of square broad scales like the long-tailed rats, but the end of the tail is furnished with a series of rigid hairs on each side, like the barb of an arrow. I may remark, that besides the genera here noticed, the Dutch naturalists have described an animal under the name of *Hylogale murina*, 'Verhand. Mamm.' t. 26, f. 3, t. 27, f. 17-18, also from Borneo, which differs from the *Tupaia* (or *Hylogale*) in having a cylindrical tail covered with short hair, but furnished with a pencil of longer hair of the tip, which I propose to separate from the other under the name of *Dendrogale*. Each of these genera have a peculiar livery: the *Tupaia* are griseled yellow and brown, with a yellow streak across the shoulders; the *Hylomys* are uniform dark-coloured; the *Dendrogale* and *Ptilocercus* have no shoulder-streak, but a dark streak on the side of the face inclosing the eyes; the former having a white spot on the forehead not observable in the latter.

At first sight *Ptilocercus* has much the appearance of a marsupial animal allied to *Cuscus*, but this resemblance proves to be only in the mere external form, when the characters are examined, as for example, it wants the large great-toe of that group.

The skulls of *Tupaia* and *Ptilocercus* have a considerable resemblance to that of the *Lemuridæ*, and particularly in having the orbits entire. The *Tupaia* are peculiar in having a large elongated aperture

on the hinder part of the middle of the zygomatic arch, while the *Ptilocercus* has only a small round perforation in the front part of the middle of the same part, which is probably the analogue of the hole in the former genus.

PTILOCERCUS, n. g.

Head moderately tapering; whiskers elongated, rather rigid. Ears moderate, naked, exposed. Body slender, fur soft. Limbs moderately elongated, nearly equal. Toes 5.5, rather compressed, free. Thumb moderate, like the toes, but shorter. Claws short, compressed, triangular, acute. Tail elongate, cylindrical, hairy quite at the base, then naked, covered with rings of square, broad, adpressed scales and short scattered hairs, and the hinder third with a series of elongate hairs, forming a barb on each side. Skull conical; face rather short.

Cutting teeth $\frac{1.1.1.1}{3.3}$: upper elongate, far apart, rather curved; lower shelving, front pair conical, small, shorter than the middle pair, which are elongate, curved, acute; the hinder smallest and shortest.

Canines none. Grinders $\frac{7-7}{7.7}$, the front 3.3 in each jaw, small; the hinder 4.4 large, square, acutely tubercular.

The skull is shorter, broader, and the face less elongated than that of the different species of *Tupaia*, and it differs from them in the two front teeth of the lower jaw being smaller and shorter than the succeeding one, while in all the species of *Tupaia* (including the genus *Dendrogale*) figured by Temminck, the four front teeth of the lower jaw are equally elongated.

The hinder cutting tooth in the upper jaw is placed on the suture of the intermaxillary (and hence may be a true canine) and not in front of the suture of the intermaxillary, as is the case with the skull of *Tupaia tana* and *T. ferruginea* in the British Museum collection.

PTILOCERCUS LOWII.

Blackish-brown, very minutely grizzled with the yellowish tips of the hairs; lips, lower part of cheeks, chin, and beneath yellowish: sides of the face inclosing the eyes black. Tail black: barbs white, except a few hairs near the scaly part, which are black.

Length, $5\frac{1}{2}$ inches; tail, $6\frac{1}{2}$; hind-foot, 1. Skull: length, $1'' 4'''$; tooth line, $7\frac{1}{2}'''$; of face, $5'''$; of zygomatic arch, $7\frac{3}{4}'''$; width at zygomatic arch, $9\frac{1}{2}'''$; at temples, $6\frac{1}{2}'''$; between orbits, $3\frac{3}{4}'''$.

Inhab. Borneo, Sarawak.

I have named this species after my friend Mr. Hugh Low, who has much enriched our knowledge of the natural productions of Borneo.

3. ON THE HABITS OF *AMEIVA DORSALIS*. BY P. H. GOSSE.

This species is one of the most common of the reptiles of Jamaica, and is as beautiful as abundant. Its colours are striking, but not showy; its countenance has a very meek expression, not altogether unlike that of a deer or antelope. All its motions are elegant and sprightly; when it is proceeding deliberately, its body is thrown into

lateral curves the most graceful imaginable; but when alarmed, its swiftness is so excessive that it appears as if it literally *flew* over the ground, and the observer can scarcely persuade himself that it is not a bird.

The Ground Lizard (as it is provincially termed) is generally diffused, as far as my knowledge of the island extends, but chiefly affects sandy places. Near the sea-side it is particularly abundant, beneath the shore-grasses, nickers, and black-withes that form an almost impenetrable belt of thicket a few yards above high-water mark. Here the dry leaves and twigs are rustled all day long by the fleet-footed Ameiva, as it shoots hither and thither among them, or walks at leisure, picking up little atoms of food. Though excessively timid, so that it is almost impossible to approach them, I have found that by sitting down in their haunts, and remaining for some time perfectly still, one and another will come forth from their coverts and pursue their avocations without fear. They pick among the sand exactly in the manner of a bird, and scratch it away with the long and flexible fore-feet, using them alternately as the common fowl does, now and then stopping and raising the hind-foot to scratch the head.

I am told (and have no doubt of the fact) that it digs for itself the burrow in which it resides. It is accused too of digging still deeper, to get at the seed-corn when just sprouting, and of eating the germinating grain to such an extent as to be mischievous. Of such as I dissected, however, I found the food to consist principally of insects. Thus on one occasion the stomach was occupied with a whole cockroach, and the intestines were filled with fragments of another. In the stomach of one shot in November I found many dipterous maggots, fragments of beetles, and one or two seeds of berries. A third contained cockroaches, a caterpillar, some maggots and small beetles.

On one or two occasions, as when one has been suddenly alarmed, I have noticed a singular action in this animal, which then carries its body the whole height of the legs above the ground, and runs as it were on tiptoe in a very ludicrous manner.

While speaking of its progression, I may observe, that though the toes are not formed like those of the Geckos and Anoles, for holding on against gravity, I have seen a large Ameiva run with facility on the side of a dry wall, along the perpendicular surfaces of the large stones.

A gravid female was brought me early in May, in whose dilated abdomen I found four eggs, two on each side, disposed longitudinally, each lateral pair connected by membrane, or rather by the oviduct. They were in form long-oval, $\frac{7}{10}$ inch long by $\frac{4}{10}$ wide, of a dull white, but covered with a fine membrane, over which spread a few blood-vessels. On making an incision into one I found no glaire, but the whole interior filled with a yellow yolk, exactly resembling in colour and consistence that of a pale hen's egg.

Two eggs were brought me about the middle of the same month, taken from a Ground Lizard's burrow; their form was a perfect oval, measuring $\frac{9}{10}$ inch by $\frac{7}{10}$; their colour white, except that the surface

was a little stained by contact with the moist earth; they were covered with a calcareous shell, which however appeared very thin, and even flexible.

The Ground Lizard is exclusively terrestrial; it never climbs trees, nor does it voluntarily take to the water. A large male which was brought me one day was said indeed to have been taken in the river, but upon inquiry I found that the little lad who obtained it had discovered it by suddenly lifting a large stone at the very margin of the water, and that the lizard in its alarm had leaped into the stream. In order to ascertain its powers, I carried it to a deep pool of the river and put it in: it instantly began to swim with much rapidity, and in a peculiarly elegant manner, throwing the body into horizontal serpentine curves, while both the fore- and hind-feet were stretched out behind, and remained quite motionless. It was thus able to cross a small stream with ease, but if prevented from landing it soon became weary, and abandoned all effort, resigning itself to the current, and became in a short time much exhausted.

On the inner surface of the thigh there is in this genus (as in many other of the Lizards) a series of scales, each of which is perforated with a conspicuous pore. From these pores exude during life minute cylindrical bodies like amber or hard yellow gum. On removing the integuments we find lying immediately beneath this range of pores, adhering to the skin but not to the muscle, a compound body, apparently glandular, composed of yellow threads, lying parallel to each other, but twisted exactly like the strands of a rope, in a regular spiral. Undoubtedly this gland secretes the yellow gummy matter that exudes, but of what use this is I do not know; perhaps it is a sexual attraction.

The variations of surface, which take the form of broad plates on the head, throat, breast, legs and vent; of minute tubercles on the body generally, and of transverse rows of square plates on the belly and tail, are not really plates or scales, but are produced merely *by lineal depressions* of various forms *in one continuous surface*; as is distinctly seen when the integument is sloughed off in large irregular pieces, bearing all these characters.

The tongue is protrusible to the length of nearly an inch and a half from the muzzle; it is slender, flat, fleshy, and covered with shining papillæ. The extremity is cleft to the extent of half an inch, and the two tips run out to attenuated round points, which are horny, but very flexible.

As the colours of reptiles in spirits are fleeting, and as published descriptions of this species convey little notion of its beauty, I sub-join the following notes made from living specimens.

Adult male.—Length $17\frac{1}{2}$ inches, of which the tail was 12. Head and sides of neck pale reddish brown; outer surface of fore-legs and sides a deeper tint of the same hue; medial portion of back light green, brightest in front, where it runs up to a point; posteriorly it merges into a dusky hue. Upper part of tail and outer surface of hind-legs dark brown. Throat, breast and under part of fore-legs white; belly and under surface of hind-legs pale blue; under surface

of tail pale blue, medially white. On each shoulder two black spots. The sides of the body and tail, and the front of the hind-legs and feet, are studded with round spots of brilliant azure-blue.

The female differs from the male only in inferior size. The young has no green point on the back, but two rows of bright dots on each side: the tail brilliant azure, metallic-green at the base.

February 22, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read:—

1. ON A NEW SPECIES OF CHIMPANZEE. BY PROFESSOR OWEN, F.R.S. ETC. ETC.

This communication contained a description of the skulls of adult and aged male and female Chimpanzees from the Gaboon river, west coast of Africa, much exceeding in size and specifically distinct from the previously known *Troglodytes niger*. The author proposed to call the new species *Troglodytes Savagei*, after Dr. Thos. S. Savage, by whom it had been discovered and its existence made known to Professor Owen, in a letter dated April 24th, 1847, and of which the following extract was read:—

"Protestant Mission-House,
Gaboon River, West Africa,
April 24, 1847.

"My dear Sir,

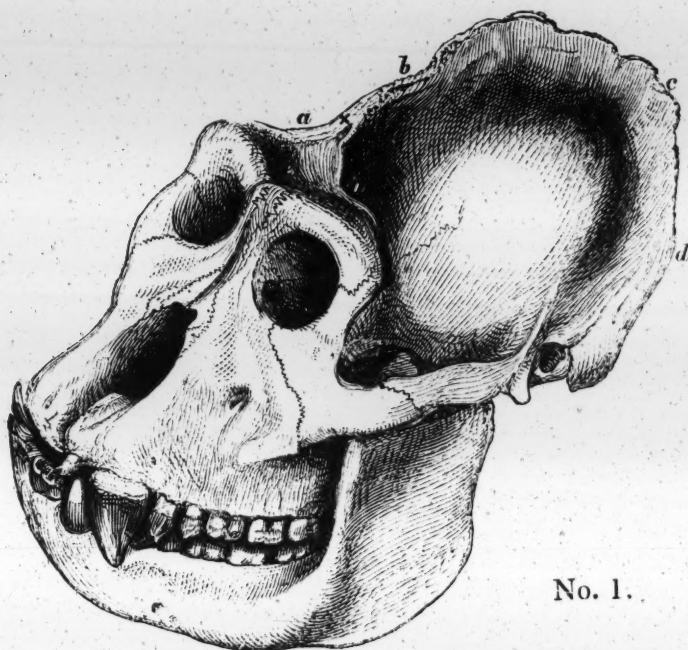
"Your known interest in the Zoology of Africa will find a ready excuse I trust for the following communication, and lead you, in the midst of various engagements, to give me a few moments in reply. I am on my way to the United States in a vessel which, to complete its voyage, had to touch at this point. I find it a region rich and untried in all the departments of Natural History, besides being full of interest in a far more important point of view, that of a missionary field. I have found the existence of an animal of an extraordinary character in this locality, and which I have reason to believe is unknown to the naturalist. As yet I have been unable to obtain more than a part of a skeleton. It belongs to the *Simiadae*, and is closely allied to the Orangs proper. It reaches nearly if not quite the height of five feet in the adult state and is of a large size. I am considerably in doubt in regard to its identity with an animal said to have been known to Buffon as a large species of orang-outan, under the name of Pongo. It is referred to in a note on the 58th page of the first volume of the American edition of Cuvier's 'Règne Animal,' where he asserts that Pongo is a corruption of Boggo, which is given in Africa to the chimpanzee or to the mandrill, and

was applied by Buffon to a pretended large species of orang-outan, the mere imaginary product of his combinations. Then he says that Wurmb, a naturalist of Batavia, transferred the name (Pongo) to a monkey in Borneo, which he thinks identical with *Pithecus Satyrus* (the real orang-outan, a red orang of Asia).

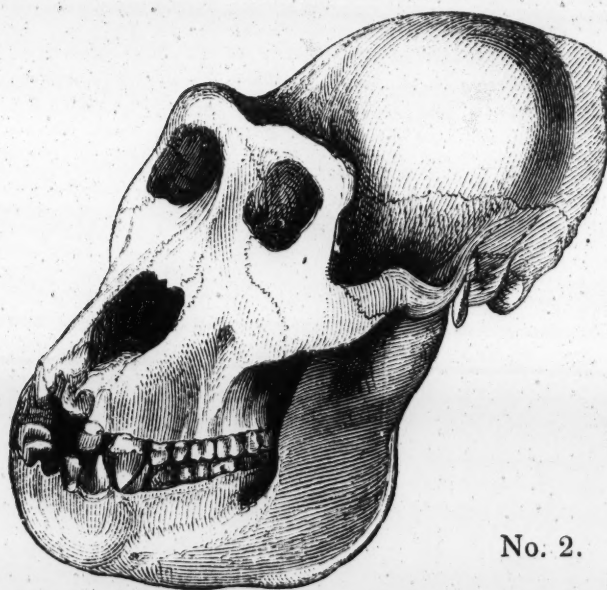
"My excellent friend, the Rev. J. L. Wilson, missionary of the Am. Bd. of Comm. For. Missions to this part of Africa, thinks that Pongo comes from 'Mpongive,' the name of the tribe, and consequently the region, on the banks of the Gaboon river near its mouth, among which tribe he has resided for about five years. The tribe once extended a great distance on the coast above and below the river Gaboon, and the languages spoken for a great distance both above and below are evidently but dialects, with the Mpongive, of one language. Whence Buffon professed to receive his specimen of 'large species of orang-outan' I know not; but this region and its vicinity indefinitely are the only points at which, so far as I can ascertain, 'a large species of orang-outan' has been heard of except the chimpanzee, which is now well-known. I have seen it mentioned that the skeleton of the Pongo of Borneo is in the Royal College of Surgeons, of which Institution you are a Professor. Now may I solicit your aid in this matter? I will send you outlines of the skull of the male and female (adults), and ask the favour of a reply to my letter, stating whether you can identify them with that of any animal you know of under the name of Pongo, or any other cognomen. I have no correspondent in Paris; if you feel sufficient interest in the subject, will you do me the favour to ascertain from that city the fact whether such skulls exist in any cabinet there? The natives state that a young one was caught many years ago and sold to a French captain who never returned, and that it was the only individual taken out of the river. From what I know, the young skull would very much resemble that of the chimpanzee. I have four crania (two male and two female), with many bones, though not a perfect skeleton; but I hope to complete one before I leave the river, and to procure a dead subject, which I shall preserve in spirits. Great uncertainty however attends my success, as they are indescribably fierce and dangerous, and are found only far in the interior; they are killed by elephant-hunters only in self-defence.

"Below you have a sketch of the cranium of the male (No. 1) and female (No. 2), executed for me by Mrs. Prince, the wife of Dr. Prince, the English Baptist Missionary at Fernando Po, who is here for a short time in search of health. *a, a* are two low ridges converging as seen in the sketch, and uniting at *x*, and forming a strong prominent ridge in the course of the sagittal suture, which comes into a junction with a lateral ridge, *d*, sent back from the petrous portion of such temporal bone; *e* is a strong fossa of triangular shape between the ridges *a, a*. The space between the zygoma and temporal bone in a transverse direction is $1\frac{3}{4}$ inch deep; the diameter from before backwards 3 inches; at *b* is a sinus about half an inch in depth and an inch in length, with foramina

for the passage of blood-vessels and nerves. The two upper middle incisor teeth are absent, but their sockets show their size to have been nearly if not quite double the two outer ones. The two lower middle incisor teeth are narrower than the two outer.



No. 1.



No. 2.

The female cranium is a full-grown one, but differing from the male in the prominence of the ridges, the two anterior corresponding to *a*, *a* in the male, and the central are rudimental only, except at the ex-

tremes of the latter where it joins the posterior transverse ridge, lettered *d* in the male. It has lost the two middle upper incisors, which bear the same relation in respect to size to the two outer that those of the male do. All the incisors both in the upper and lower jaw are larger than they are in the male. The canines in the female are shorter than in the male. These points are all that I need specify to enable you to identify the crania with any in your possession. You will greatly oblige me by a comparison, and communicating the result at your earliest convenience."

Professor Owen having, at the time when he received this information, observed in the cranium of a young but nearly adult *Troglodytes niger* that the canine teeth presented the same sexual superiority of development* as in the orang's (*Pithecus*), believed it possible that the marks of distinction mentioned by Dr. Savage might prove to be the fully developed characteristics of old and powerful males of the *Troglodytes niger*; and in the absence of means of making comparisons of other characters, besides superior size, longer and larger canine teeth, and concomitant strong sagittal and lambdoidal cristæ, he had deemed it better to communicate these doubts to Dr. Savage, than to hazard a premature indication of a species, which might prove a sexual, or a local and stronger, variety of chimpanzee.

Mr. Samuel Stutchbury of Bristol, who had likewise received from Dr. Savage a similar announcement of the existence of a large and formidable species of chimpanzee in the Gaboon district, had requested some of the captains of vessels trading from Bristol to the Gaboon river to make inquiries respecting the species and endeavour to obtain specimens of it; and the result was that Captain George Wagstaff had succeeded in procuring at the Gaboon river, and had presented to Mr. Stutchbury, three skulls of the large species and one of the smaller species of chimpanzee, all adult: and these skulls Mr. Stutchbury had transmitted for description and exhibition at the Zoological Society.

One of the skulls of the large species (*Troglodytes Savagei*) was of a very old male: the length of the skull was $11\frac{1}{2}$ inches (0·29), with the molars worn nearly to the stumps, and the crown of the canine reduced, partly by fracture, partly by attrition, to its basal portion: its pulp had been inflamed and had produced ulceration of the alveolus.

A second skull was also of a male, of equal size, with the full dentition of maturity, but with merely the summits of the cusps of the molars and the margins of the incisors slightly worn. The third skull of the *Troglodytes Savagei* was of a female, 9 inches (0·23) long, with the mature dentition, and with the molars not more worn than in the younger male. The fourth skull was of a female adult chimpanzee, $7\frac{1}{4}$ inches (0·185) in length, of the known species (*Troglodytes niger*), with the complete permanent dentition, and the teeth more abraded than in the two preceding skulls.

* Odontography, pl. 118, 119, fig. 1.

The lower jaw was wanting in each of the foregoing specimens, and the occipital or basal part of the skull had been more or less fractured in each; the skull of the young but full-grown male of the *Troglodytes Savagei* being the most perfect.

Captain Wagstaff reached Bristol in a broken state of health, and died soon after his arrival. The only information which Mr. Stutchbury was able to obtain from him was, that the natives, when they succeed in killing one of these chimpanzees, make a 'fetish' of the cranium. The specimens bore indications of the sacred marks in broad red stripes crossed by a white stripe, of some pigment which could be washed off. Their superstitious reverence of these hideous remains of their formidable and dreaded enemy adds to the difficulty of obtaining specimens.

Besides the young but mature skull of the male *Troglodytes niger*, of which the permanent dentition was figured in the author's 'Odontography,' he had compared with Mr. Stutchbury's specimens of *Troglodytes Savagei*, a skull of a more aged male *Troglodytes niger* with the permanent dentition more worn than in the younger adult male of the *Troglodytes Savagei*. The results of a detailed comparison between the skulls of the adult males of the two species were then given. Besides the differences of size, as indicated in the subjoined 'Table of Dimensions,' the following were among the characters establishing the specific distinction of the two chimpanzees. With regard to the dentition, the author observed that, as in the smaller species of the Orangs of Borneo (*Pithecus Morio*), the incisive teeth of the smaller species of chimpanzee (*Troglodytes niger*) equalled in size those of the larger species (*Troglodytes Savagei*); but that the canines and the molars were considerably larger in the *Troglodytes Savagei*: the series of the five molar teeth in this species occupy an extent of 2 inches $7\frac{1}{2}$ lines (0.068), whilst in *Troglodytes niger* their extent is only 1 inch $10\frac{1}{2}$ lines (0.048). The crown of the canine inclines more outwards in *Troglodytes Savagei*; the longitudinal convex ridge on its inner surface is more prominent, the anterior groove bounding that ridge being deeper in *Troglodytes Savagei* than in *Troglodytes niger*: the posterior inner groove is continued upon the root of the tooth in *Troglodytes Savagei*. The last molar is more nearly equal in size to the penultimate one, and is more complex in structure, than in *Troglodytes niger*; it has the posterior outer cusp and particularly the posterior inner cusp more developed, and it has distinctly the connecting cross ridge between the posterior outer and the anterior inner cusp, which ridge is not developed in the last molar of *Troglodytes niger*. The bony palate is longer in proportion to its breadth than in *Troglodytes niger*, in which the breadth of the palate between the canines is absolutely greater than in *Troglodytes Savagei*.

The external sutures between the premaxillary and maxillary bones, which disappear so early in the *Troglodytes niger*, are more or less persistent and traceable in all but the oldest male skull of the *Troglodytes Savagei*; these sutures show that after the premaxillary bone has entered the nose, of which it forms the lateral

boundary of the external opening, it again appears upon the exterior surface of the face above the nostril, where its upper extremity forms a triangular or wedge-shaped flattened piece, interposed between the lower half of the *os nasi* and the *os maxillare superius*, thus excluding the latter bone from the boundary of the external nostril. One skull of a young *Troglodytes niger* with deciduous teeth in place, shows by the still persistent upper half of its facial suture, that it terminates in a point a little above the middle of the border of the external nostril, and that a portion of the superior maxillary is interposed between it and the nasal: in two other skulls of young *Troglodytes niger*, the slender pointed summits of the premaxillaries reach the nasals and exclude the maxillaries from the boundary of the nostril, but do not expand into triangular plates as in *Troglodytes Savagei*: in not any of the skulls of *Troglodytes niger* with the permanent dentition does any trace of the suture between the premaxillaries and maxillaries remain*.

The nasal bones of the *Troglodytes Savagei* also afforded a remarkable specific character: although the traces of their primary median division were obvious at their lower part, they had coalesced with each other as in the smaller species; but instead of being flat, or slightly and equably convex on the anterior surface, as in *Troglodytes niger*, they are produced forwards as they incline towards each other, along their upper half, and project there in the form of a slight bony longitudinal ridge, equally dividing the lower half of the interorbital space. This character—the nearest approach to the prominent nasal bones of Man made by any known species of ape—is as well-marked in the female *Troglodytes Savagei* as in the male. The lower half of the coalesced nasals in *Troglodytes Savagei* is expanded and nearly flat, of an oval form, with the border forming the upper part of the nostril emarginate on each side of a median, sometimes bifid, point. Thus the lateral border of the nasal bone describes a strong sigmoid curve, convex outwards in its lower two-thirds, in *Troglodytes Savagei*; in the less expanded nasal bone of *Troglodytes niger* the same border is usually concave outwards, or very slightly convex outwards at the lower third; and the outer surface of the bone is flat or equably and very slightly convex. The greater breadth of the lower end of the nasal with the expansion of the upper ends of the premaxillaries, gives a different form to the external nostril in the *Troglodytes Savagei* to that which it presents in *Troglodytes niger*: in this it is ovate or cordate with the narrow end upwards; in the larger species it is a wide ellipsoid, almost as broad above as below.

The alveolar portion of the premaxillaries in *Troglodytes Savagei* was absolutely shorter than in *Troglodytes niger*, and therefore much shorter relatively, and to that extent the skull of the larger species is less 'prognathic.' The zygomatic processes were not

* M. de Blainville, describing the osteology of the chimpanzee from a young specimen of the *Troglodytes niger*, says, "Mais les prémaxillaires, qui offrent la particularité de toucher à peine les os du nez et de souder de fort bon heure avec les maxillaires," &c. Ostéographie, fasc. i. p. 33.

only absolutely as well as relatively stronger and deeper than in *Troglodytes niger*, but differently shaped; the squamosal portion rising in an angular form in *Troglodytes Savagei*, and being as deep as the malar portion. The temporal fossæ are relatively as well as absolutely wider; for whilst the zygomatic arches are more expanded, the diameter of the intervening postorbital part of the cranium is the same in the male *Trogl. Savagei* as in the *Trogl. niger*. There is a distinct hemispheric mastoid process in the male *Troglodytes Savagei*. The speno-maxillary fissure is narrower and less bent in *Troglodytes Savagei* than in *Troglodytes niger*, in which it more nearly resembles that of Man. The supraorbital ridges were even proportionally more developed in the larger than in the smaller species of chimpanzee, and send down a vertical prominence to the root of the nasal bones. The outer and lower borders of the orbits, and the whole malar bones are more prominent and tumid, and, with the enormous sagittal and lambdoidal crests and zygomatic arches, give a scowling and diabolical physiognomy even to dry bones of the head of this most formidable of the great Anthropoid apes.

In the skull of the female of the *Troglodytes Savagei* in which the canine teeth show the same sexual inferiority of size as in the female *Troglodytes niger*, the molar teeth present the same superior degree of development and complexity, especially the last molar, as in the male of the larger species, and have demanded a concomitant increase of bulk of the temporal muscles; and consequently not only are the zygomatic arches relatively stronger, but the temporal ridges, instead of being separated as shown in an aged skull of the female *Troglodytes niger* in the museum of the College of Surgeons, by a smooth tract of more than an inch in breadth, come into contact at the beginning of the sagittal suture, and are so continued backwards with a narrow groove between them, to the lambdoidal crest. The development of this crest also renders the supraoccipital surface almost flat in the female *Troglodytes Savagei*, and it is even concave in the great males; whilst in both adult males and females of the *Troglodytes niger* it is convex.

There are specific distinctions in the interior of the cranium of the two species: the olfactory (rhinencephalic) fossa closed by the cribriform plate, though very little wider, is considerably deeper in *Troglodytes Savagei* than in *Troglodytes niger*; and the 'crista galli,' which is small in *Troglodytes niger*, is absent in *Troglodytes Savagei*, nor is there any ridge continued from the fossa upon the inner surface of the frontal in the line of the frontal suture.

In *Troglodytes niger* there is a short *ala minor sphenoides* continued outwards from the anterior clinoid process, and the upper and outer angle of the foramen lacerum anterius is produced into a short cleft: in *Troglodytes Savagei* the rudiment of the *ala minor* terminates at the upper border of the foramen lacerum anterius, which has a subquadrate form, and is not extended outwards into an angular fissure. The *sella turcica* is relatively shallower in *Troglodytes Savagei* than in *Troglodytes niger*, it which it is shallower than in Man.

Many other minor differences were noted, but these would be No. CLXXXII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

better understood by the aid of the figures in the memoir. Some scepticism, the author observed, might be expected as to the alleged specific distinction of the large and small chimpanzees by naturalists who had not been able to realise the differences by actual comparison of the specimens; but Professor Owen felt no doubt that, as in the case of the *Pithecus Morio*, more extended knowledge of the new species would confirm the validity of its distinction from the *Troglodytes niger*.

The stronger zygomatic arches and the more developed sagittal and lambdoidal crests might be viewed as adaptive developments concomitant on the larger canines, and indicative of a larger and more powerful variety of chimpanzee; but the larger proportional molars and the smaller proportional incisors, the more equal and complex last molar tooth, together with the prominence—slight as it is—of the nasal bones at their median coalescence, their inferior expansion, and, above all, the reappearance of the premaxillaries by their expanded superior extremities upon the face above the nostril, are more than mere differences of size and proportion, and being repeated in both male and female adults of the great chimpanzee of Gaboon, leave no alternative, according to the value assigned to such characters in other Quadrumanous genera, than to pronounce the *Troglodytes Savagei* to be specifically distinct from the *Troglodytes niger*, and this to be, as the *Pithecus Morio* is to the *Pithecus Wurmbii* in Borneo, a smaller, feebler and more anthropoid species of the genus *Troglodytes* in Africa.

In conclusion, Prof. Owen remarked that he had proposed the name of the new species of Chimpanzee provisionally, for the convenience of its description and comparison; and that, should he be able to learn that its discoverer had given a name to it, he should adopt that name, of which *Troglodytes Savagei* would then be a synonym.

	<i>Troglodytes Savagai.</i>		<i>Troglodytes niger.</i>		<i>Simia Wurmbii.</i>	
	Adult Male.	Adult Female.	Adult Female.	Adult Male.	Adult Orang. Female.	Male.
	in. lin.	in. lin.	in. lin.	in. lin.	in. lin.	in. lin.
Length of the head from the <i>inion</i> , or posterior plane of the occiput, to the margin of the incisors	11 4	9 0*	7 6	8 0	8 6	10 6
Length of the head from the <i>inion</i> to the fronto-nasal suture	7 5	6 3	5 2	5 4	5 7	6 3
Length of the head from the fronto-nasal suture to the margin of the incisors ...	5 3	4 4	3 8	3 10	4 4	5 3
Transverse diameter of the <i>cranium</i> at the post-auditory ridges	6 10	5 6	4 9	5 1	4 8	5 8
Length of the smallest lateral diameter of the <i>cranium</i> behind the orbits	2 9	2 5	2 8	2 9	2 6	2 9
Length of the <i>os frontis</i>	4 3	3 7	2 9	2 10	3 0	3 6
Length of the sagittal suture	3 9	3 0	2 6	2 8	2 7	3 6
Distance between the temporal ridges	nil	nil	1 0	nil	0 6	nil
Diameter of the face at the zygomata	6 9	5 3	4 8	5 0	5 0	6 9
Length of the zygomatic <i>fossa</i>	2 10	2 0	1 9	1 11	2 0	2 6
Breadth of the zygomatic <i>fossa</i>	1 11	1 5	1 1½	1 4	1 5	1 10
Diameter of the face taken from the outside of the middle of the orbits	5 6	4 8	4 3	4 4	3 9	4 8
Interorbital space	1 3	1 1	0 7†	0 10	0 5	0 7
Lateral diameter of the orbit	1 9	1 6	1 4	1 5	1 4	1 6
Perpendicular diameter of the orbit	1 7	1 7	1 3	1 3	1 6½	1 7
Transverse diameter of the nasal aperture	1 2	1 2	1 0	1 0	1 1	1 0
Perpendicular diameter of the nasal aperture	1 5	1 3	1 1½	1 2	1 6	1 6
Distance between the infraorbital <i>foramina</i>	2 7	2 5	2 1	2 2	1 8	2 0
Breadth of the alveolar portion of the <i>maxilla superior</i>	3 1	2 7	2 4	2 6	2 8	3 2
Distance from the inferior margin of the nasal bone to the inferior margin of the intermaxillary bones	2 6	2 3	2 3	2 7	2 7	3 3
Length of the bony palate	4 1	3 4	2 10	3 1	3 3	4 0
Distance from the anterior margin of the intermaxillary bones to the anterior palatal foramen	1 1	0 10	0 10	1 0	1 3	1 3
Antero-posterior extent of the palatal process of the palate bone	1 1	0 7	0 6	0 7	0 8	
Breadth of the crown of the first incisor	0 6	0 5+	0 5	0 6	0 5	0 7
Breadth of the crown of the second incisor	0 4½	0 4+	0 4	0 5	0 3½	0 4
Breadth of the four incisors (upper jaw) ...	1 7	1 6+	1 6	1 6½	1 6	1 9
Length of the grinding surface of all the <i>molars</i> , the <i>bicuspides</i> included	2 8	2 7	1 9	1 9½	2 1	2 2
Length of the crown of the canine tooth	1 4	†	0 6	0 10	1 2	1 0
Breadth of the enameled crown of the canine tooth	0 10	†	0 5½	0 7	0 6	0 9
Interspace between the canine and incisor teeth, upper jaw	0 2	0 1½	0 3	0 4	0 3½	0 3
Distance from the anterior margin of the occipital <i>foramen</i> to the posterior margin of the bony palate	3 0	§	2 4½	2 5	2 9	2 10

* To front border of premaxillaries.

† This varies according to the outswelling of the æthmoidal cells; in one female skull of *Trogl. niger* the interorbital space was an inch across.

‡ Of the alveolus.

§ Base mutilated.

|| Suture obliterated.

2. ADDITIONAL MEASUREMENTS OF THE RED CORPUSCLES OF THE BLOOD OF VERTEBRATA. No. 4. BY GEORGE GULLIVER, F.R.S.

A reference to the preceding numbers of these papers will be found in the Proceedings of the Zoological Society, October 14, 1845, p. 93, where are also tables of my measurements of the blood-corpuscles up to that date, with summary notices of the most remarkable results as to the size of those corpuscles in vertebrate animals. A note concerning the size of the blood-corpuscles of Birds is given in the same Proceedings for March 24, 1846: and numerous observations on the size, shape, and structure of the blood-corpuscles of Vertebrata are contained in my Notes to the edition of Hewson's Works, lately printed for the Sydenham Society.

The following measurements, like all my former ones, are expressed in vulgar fractions of an English inch, and for the sake of brevity, on this occasion the average sizes only are given: L.D. denotes the long diameter and S.D. the short diameter of the corpuscles. A few remarks may be now added to illustrate the bare figures.

After my observation (see Dublin Medical Press for November 1839, and Proceedings of the Zoological Society, No. CXV. p. 107) of the remarkable minuteness of the red corpuscles of the blood of the Napu Musk Deer, it was to be expected that the corresponding corpuscles in the other species of *Moschus* would have a similar character. Accordingly, in Stanley's Musk Deer I found those corpuscles almost as small; and in my late measurements, the average of which is now given, of the blood-corpuscles of the Meminna Deer, I could perceive no difference between them and those of the Napu Musk Deer.

In the books of physiology, before the observations just mentioned, the blood-corpuscles of the Goat used to be described as the smallest in the Mammalia (see Prevost and Dumas; and Müller, Physiology, tr. by Dr. Baly, 1838, vol. i. p. 101; Mandl, Anatomie Générale, 1843, p. 248); but to the list of animals in which I have already found those corpuscles still smaller, are now to be added the Meminna and two species of Brocket Deer.

In the Red Brocket Deer (a female) the majority of the blood-corpuscles were of the spear-shaped, lunated, and sigmoidal forms, described and figured from the blood of some other *Cervidæ* in the Lond. and Edin. Philosophical Magazine, November 1840, p. 329, and noticed in my Appendix to Gerber's Anatomy, p. 11 to 12: there were also many of the common circular corpuscles. The blood-corpuscles of a new species of Brocket Deer (a male, from Brazil) were of the usual circular shape. In the magazine above-cited it is suggested that those irregular forms may result from changes in the common circular discs; and this now appears more probable from the facts just mentioned. The cause of these curious changes in the shape of the blood-discs is well-deserving of further inquiry.

The blood-corpuscles of the Aurochs are scarcely distinguishable in any respect from those of its congener the Bison and of some other large ruminants.

Of the *Edentata*, as far as can be inferred from the few yet examined, the mean size of the blood-corpuscles is larger than in mammals generally. And in the genus *Bradypus*, as fully explained in the Proceedings of the Zoological Society, June 11, 1844, I found those corpuscles larger than any yet observed in Mammalia, with the single exception of those of the Elephant. This large size of the blood-corpuscles of the Sloth is confirmed by the measurement now given of them, from a younger animal than that which afforded me the blood for the former observations.

Judging from the facts at present ascertained, the marsupial animals appear to agree in the size and form of the blood-corpuscles with the corresponding placental Mammalia, as mentioned in my notice in the Dublin Medical Press, November 1839, and in the Proceedings of the Zoological Society, June 8, 1841. But in the Marsupials further observations are required. The measurement now given of the blood-corpuscles of the Crab-eating Opossum accords with the view just stated.

The following measurements of the blood-corpuscles of Birds tend to confirm the result which I have before published, that in this entire class the law for the size of the corpuscles is the same as in a single family of Mammalia; and that the short diameter of the oval blood-corpuscles of Birds has a general correspondence with the diameter of the circular blood-corpuscles of mammals.

Through the kindness of Dr. Andrew Smith, I am enabled to add measurements of the blood-corpuscles of such reptiles as were alive some time since in his very interesting and valuable collection.

Laland's Megalotis (<i>Otocyon Lalandii</i> , [Desm.])	1-3600
Meminna Deer (<i>Moschus Meminna</i> , Erxl.)	1-12325
Red Brocket Deer (<i>Cervus nemorivagus</i> , Cuv.)	1-7060
A Brocket Deer (<i>Cervus</i> —a new species)	1-7125
Aurochs (<i>Bos Urus</i> , Bodd.)	1-4074
A young Sloth (<i>Bradypus didactylus</i> , Linn.)	1-2778
Anteater (<i>Echidna hystrix</i> , Cuv.)	1-3300
Crab-eating Opossum (<i>Didelphis cancrivora</i> , Temm.) . .	1-3436
Red-legged Falcon (<i>Falco rufipes</i> , Bechst.)	{ L.D. 1-2000 S.D. 1-3790
Long-eared Owl (<i>Otus vulgaris</i> , Flem.)	{ L.D. 1-1830 S.D. 1-3400
Little Owl (<i>Strix passerina</i> , Temm.)	{ L.D. 1-1885 S.D. 1-3555
Red-backed Shrike (<i>Lanius collurio</i> , Linn.) ..	{ L.D. 1-2230 S.D. 1-3878
Cassowary (<i>Casuarus emu</i> , Lath.)	{ L.D. 1-1455 S.D. 1-2800
Great Bustard (<i>Otis tarda</i> , Linn.)	{ L.D. 1-1811 S.D. 1-3200
Houbara Bustard (<i>Otis houbara</i> , Gmel.)	{ L.D. 1-1814 S.D. 1-3200
Three-keeled Emys (<i>Emys trijuga</i> , Schw.) ..	{ L.D. 1-1333 S.D. 1-1909

Caspian Emys (<i>Emys Caspica</i> , Schweig.)	{ L.D. 1-1103
	{ S.D. 1-2000
<i>Testudo mauritanica</i> , Dum. & Bib.	{ L.D. 1-1280
	{ S.D. 1-2000
<i>Testudo tabulata</i> , Walbaum	{ L.D. 1-1143
	{ S.D. 1-2000
<i>Gymnopus Ægyptiacus</i> , Geoff.; <i>labiatus</i> , Bell	{ L.D. 1-1143
	{ S.D. 1-2000
<i>Morelia Argus</i> , Dum. & Bib.	{ L.D. 1-1371
	{ S.D. 1-1685
<i>Proteus</i> (<i>Proteus anguinus</i> , Laur.)	{ L.D. 1-400
	{ S.D. 1-727
Common Trout (<i>Salmo fario</i> , Linn.)	{ L.D. 1-1524
	{ S.D. 1-2900
Grayling (<i>Thymallus vulgaris</i> , Nilss.)	{ L.D. 1-1684
	{ S.D. 1-2900

3. ON SEVEN NEW SPECIES OF AUSTRALIAN BIRDS.

BY JOHN GOULD, F.R.S. ETC.

GRAUCALUS HYPOLEUCUS.

Lores black; crown of the head and all the upper surface dark grey; wings and tail black; chin, under surface of the wings, abdomen and under tail-coverts white; breast pale greyish white; irides brownish black; bill blackish brown; legs and feet black; insides of the feet and spaces between the scales of the tarsi mealy grey.

Total length 9 inches; bill $1\frac{1}{8}$; wing $5\frac{3}{4}$; tail $4\frac{3}{4}$; tarsi 1.

Hab. Port Essington.

Remark.—Distinguished from all the other Australian members of the genus by the whiteness of the under surface.

LIMOSA UROPYGIALIS.

All the upper surface brownish grey, becoming dark brown in the centre and nearly white on the edges of the feathers; primaries brown, with white shafts; rump and upper tail-coverts conspicuously barred with brown and white; tail alternately barred with brown and white; throat and abdomen white; neck and breast brownish grey; under wing-coverts and flanks barred with brown and white; bill white at the base, becoming brown at the tip; irides dark brown; legs brownish black.

Total length 15 inches; bill $3\frac{1}{4}$; wing $8\frac{3}{4}$; tail $3\frac{1}{4}$; tarsi $2\frac{1}{8}$.

Hab. Australia.

Remark.—Distinguished from *Limosa rufa* by the rump being barred instead of white as in that species. The female is about a third larger in all her admeasurements than the male.

CHARADRIUS VEREDUS.

Crown of the head and all the upper surface brown, each feather narrowly fringed with buff; primaries blackish brown, the shaft of the first white; tail brown, narrowly edged with white, the brown colour gradually fading as the feathers recede from the centre; face,

a broad stripe over the eye, and the chin, buffy white; sides and back of the neck, and the breast, buffy brown; abdomen and under surface white; irides very dark brown; legs and feet brownish flesh-colour; bill dark brown.

Total length $8\frac{1}{2}$ inches; bill $1\frac{1}{8}$; wing $6\frac{1}{2}$; tail $2\frac{1}{8}$; tarsi 2.

Hab. Northern Australia.

Remark.—This species exhibits characters pertaining both to the true Plovers and to the Coursers, and would seem therefore to have just claims to be made the type of a new genus; but before separating it, it will be necessary to know something of its habits, and also if it undergoes any periodical change of plumage.

TOTANUS GRISEOPYGIUS.

Head, all the upper surface, rump and tail, greyish brown; primaries dark brown; line over the eye and all the under surface white; the neck, breast and flanks strongly freckled with brown; irides reddish brown; bill blackish brown, except the base of the under mandible, which is scarlet; legs and feet hyacinth-red.

In winter the upper surface is of a much lighter hue, and the under surface is of a greyish white and destitute of the brown freckles.

Total length $8\frac{3}{4}$ inches; bill $1\frac{3}{4}$; wing $6\frac{3}{4}$; tail $2\frac{7}{8}$; tarsi $1\frac{1}{4}$.

Hab. Port Essington.

Remark.—Distinguished by the uniform grey colouring of the rump and upper tail-coverts.

SCHÆNICLUS MAGNUS.

Crown of the head, and the neck, brownish grey, each feather with a stripe of brown down the centre; back and wings brown, broadly margined with brownish grey; primaries blackish brown; rump white, each feather tipped with brown; tail brownish grey; feathers of the breast dark brown, with a crescent of white at the extremity; abdomen and under tail-coverts white; flanks mottled with brown; bill, feet, and irides, olive.

Total length $9\frac{1}{2}$ inches; bill $1\frac{3}{4}$; wing 7; tail $2\frac{1}{4}$; tarsi $1\frac{3}{8}$.

Hab. Australia.

Remark.—Of this species of *Schœniclus*, which is distinguished by its large size, the only examples that have come under my notice are in the British Museum, and a second in the possession of the Hon. Charles Neville, to whom I am indebted for the loan of it for illustration in my 'Birds of Australia.'

ARDETTA MACRORHYNCHA.

Crown of the head and occipital crest black, with green reflexions; neck, all the upper surface and wing-coverts greenish olive; wing-coverts narrowly margined with deep rufous; primaries and tail slate-grey; spurious wing, secondaries and all but the three or four external primaries with an irregular triangular-shaped spot at the tip; down the centre of the throat a series of oblong marks of dark brown and white, forming a conspicuous mottled stripe, continued into the breast, where it is lost in the mingled grey and buffy brown of the abdomen; upper mandible dark reddish brown; basal portion of the

lower one oil-green; tibiæ and hinder part of the tarsi bright yellow; remainder of the legs and feet yellowish brown.

Total length 17 inches; bill $3\frac{3}{4}$; wing $7\frac{3}{4}$; tail 3; tarsi $2\frac{1}{8}$.

Hab. East coast of Australia.

Remark.—Differs from the *Ardetta Javanica* in being considerably larger in size and in the great size of its head and bill.

CRATICUS PICATUS.

Collar at the back of the neck, centre and edge of the wing, rump, abdomen, under tail-coverts and tips of all but the centre tail-feathers white; remainder of the plumage deep black; irides dark reddish brown; bill ash-grey, the tip black; legs and feet dark greenish grey.

Total length 10 inches; bill $1\frac{3}{4}$; wing 6; tail $4\frac{3}{4}$; tarsi $1\frac{1}{4}$.

Hab. Northern Australia.

Remark.—A miniature representative of, and nearly allied to, but distinct from, *Cracticus nigrogularis*.

March 14, 1848.

Dr. Gamble in the Chair.

The following papers were read:—

1. DIAGNOSES SPECIERUM NOVARUM GENERIS PLANORBIS COLLECTIONIS CUMINGIANÆ. AUCTORE GUIL. DUNKER, DRE.

1. PLANORBIS INFLATUS, Dkr. *Pl. testâ magnâ, inflatâ, fusco-olivaceo- et cinereo-corned, nitidâ, striatâ, suprâ profundè umbilicatâ, infrâ concavâ, anfractibus 4 inflatis celerrimè crescentibus; aperturâ reniformi; fauce fusca.*

Diam. max. $1'' 1'''$; alt. aperturæ $8'''$.

Species tum colore, tum habitu varietatibus quibusdam *Pl. cornei*, simillima. Anfractus primordiales striis spiralibus insignes.

Patria cochleæ eximie ignota est.

2. PLANORBIS NITIDULUS, Dkr. *Pl. testâ parvulâ, pallidè corneo-fulvescente, nitidulâ, pellucidâ, suprâ profundè umbilicatâ, basi planâ; anfractibus $3\frac{1}{2}$ rotundatis; aperturâ obliquè ovatâ.*

Diam. max. $1\frac{3}{4}'''$; alt. $\frac{1}{2}'''$.

Species hæc parvula basi planâ et latere superiore umbilicato noscenda, in Chersoneso aureâ (pænisula Malacca) plantis aquaticis insidens reperta est. (H. Cuming.)

3. PLANORBIS GILBERTI, Dkr. *Pl. testâ depressâ, sublenticulari, pallidè corneâ, nitidâ, pellucidâ, superâ paginâ planiusculâ, infernè umbilicatâ; anfractibus tribus utrinque obtusè angulatis;*

infrà medium acutè carinatis ; aperturà obliquà, subcordatà ; margine superiore producto.

Diam. max. $2\frac{1}{2}'''$; alt. $\frac{3}{4}'''$.

Species *Planorbi exacuto*, Say., similis, differt vero umbilico latiore, foveolâ lateris superioris medianâ, et carinâ obtusâ in superâ et inferâ anfractuum paginâ. Reportata est e Novâ Hollandiâ à cl. Gilbert.

4. *PLANORBIS CHINENSIS*, Dkr. *Pl. testâ parvâ, cornedâ, subtiliter striatâ, subdiaphandâ, paginâ superâ convexiusculâ, medio impressâ, paginâ inferâ latè umbilicatâ ; anfractibus $3\frac{1}{2}$ ovatis medio subcarinatis ; aperturâ obliquâ, subcordatâ.*

Diam. max. $2\frac{1}{4}'''$; alt. $\frac{2}{3}'''$.

Species hæc à cl. H. Cuming in rivulo ad Hong Kong in China detecta, *Pl. deformi*, Lam., similis, sed carinâ obsoletâ et latere superiore minus convexo diversa.

5. *PLANORBIS PANAMENSIS*, Dkr. *Pl. testâ parvulâ, albidâ vel pallidè cornedâ, diaphandâ, haud nitente, striis tenuissimis confertis lineisque spiralibus remotis et obsoletis subdecussatâ, suprâ planoconvexâ, medio impressâ, infrâ umbilicatâ ; anfractibus $2\frac{1}{2}$ —3 ovatis ; aperturâ obliquâ.*

Diam. max. $1\frac{1}{2}'''$; alt. $\frac{1}{2}'''$.

Hab. in rivulis ad Panama (H. Cuming). Magnam affinitatem præbet cum *Pl. elevato*, Adams.

6. *PLANORBIS HINDSIANUS*, Dkr. *Pl. testâ parvulâ, cornedâ, subviridescente, tenuissimè confertimque striatâ, diaphandâ, subnitidâ, suprâ planiusculâ, medio impressâ, infrâ umbilicatâ ; anfractibus tribus ovatis ; aperturâ obliquâ.*

Species magnitudine ferè præcedentis, sed colore et striis spirali-bus deficientibus satis diversa.

Hab. in insulâ Puna in sinu ad Guayaquil (R. B. Hinds).

7. *PLANORBIS OBESUS*, Dkr. *Pl. testâ solidâ, tenuiter densèque striatâ, nitidâ, subsericeâ, fusco- seu luteo-cornedâ, utrinque concavâ ; anfractibus $3\frac{1}{2}$ —4 tumidis celeriter crescentibus, aperturâ subreniformi, labro intus subincrassato.*

Diam. max. $7'''$; alt. $3\frac{1}{4}'''$.

Pl. trivolti, Say., affinis, sed striis subtilioribus, aperturâ minore, testâ crassiore et carinâ in latere basali deficiente distincta.

Patria ignota.

8. *PLANORBIS CUMINGIANUS*, Dkr. *Pl. testâ magnâ, discoideâ, crassiusculâ, suprâ cornedâ subrufâ, infrâ olivaceâ, nitidâ, obsoletissimè striatâ, ferè glabratâ, utrinque concavâ ; anfractibus senis ovatis, suturâ profundâ divisâ ; aperturâ obliquâ, ovato-sublunatâ.*

Diam. max. $1'' 1\frac{1}{3}'''$; alt. $3'''$.

Planorbi olivaceo simillimus, sed colore, testâ crassiore, splendidiore ferè glabratâ, umbilico latiore, anfractibus convexioribus minus involutis aliisque notis bene distinguendus.

Patria ignota.

9. *PLANORBIS SIBIRICUS*, Dkr. *Pl. testá parvá, tenui, pallidè corned, subtilissimè striatá, suprà planiusculá, medio impressá, infrà concavá; anfractibus $3\frac{1}{2}$ ovatis, modicè crescentibus, suturá distinctá divisís; aperturá obliquá, ovatá.*

Diam. max. $2'''$; alt. $\frac{1}{2}'''$.

Pl. albo affinis, sed colore et capillis deficientibus diversus.

Hab. in Sibiria.

10. *PLANORBIS FOKKESII*, Dkr. *Pl. testá parvá, albidá, subcorned, nitidá, diaphaná, suprà plano-convexá seu planá, medio profundè impressá, infrà umbilicatá; anfractibus tribus subtumidis, celeriter ferè crescentibus tenuiterque striatis, ultimo declinato; aperturá subrotundá, perobliquá, margine superiore producto.*

Diam. max. $2\frac{1}{2}'''$; alt. $1'''$.

Patria ignota.

11. *PLANORBIS FUSCUS*, Dkr. *Pl. testá tenui, fuscá, subtilissimè longitudinaliter transversimque striatá, suprà convexiusculá, infrà concavá, latere utroque umbilicatá; anfractibus $2\frac{1}{2}$ teretibus, subceleriter crescentibus, ultimo paullò descendente; aperturá rotundatá.*

Diam. max. $3\frac{1}{2}'''$; alt. $1\frac{1}{4}'''$.

Tria hujus speciei exemplaria plane congruentia exstant, quæ cl. Cuming in paludibus ad Valparaiso invenit.

12. *PLANORBIS SERICEUS*, Dkr. *Pl. testá majusculá, tenuissimè decussatá, fusco-corned, interdum luteo-albidá, nitore sericeo insigni, superá et inferá paginá concavá; anfractibus quinís albis utrinque carinatis; aperturá obliquá, ferè semilunatá, infrà et suprà angulatá.*

Diam. max. $7'''$; alt. $3'''$.

Testa Pl. tenagophilo, Orb., affinis, sed magis involuta et regularis.

Patria ignota.

13. *PLANORBIS STRAMINEUS*, Dkr. *Pl. testá tenuistriatá, nitidá, parùm diaphaná, stramineá, subcorned, suprà plano-concavá, medio impressá, infrà umbilicatá; anfractibus 4 subrotundis; aperturá dilatatá, ferè rotundatá.*

Diam. max. $5'''$; alt. ferè $2'''$.

Primo adspectu Helicibus quibusdam similis, ex. gr. Helici erice-torum.

Patria America australis (H. Cuming).

14. *PLANORBIS RUPPELLII*, Dkr. *Pl. testá opacá, tenuiter striatá, pallidè corned, subcinereá, suprà umbilicatá, infernè concavá, anfractibus 4 ovatis modicè crescentibus; aperturá ovatá, obliquá.*

Diam. max. $6'''$ ferè; alt. $2'''$.

Patria Habessinia (Rüppell).

15. *PLANORBIS LIMOSUS*, Dkr. *Pl. testá cinereo-corned, opacá, striatá, subcarinatá, suprà convexiusculá, medio impressá, infrà umbilicatá; anfractibus tribus ovatis; aperturá obliquá, subovalí; faucibus subflavis.*

Diam. max. 3''' ; alt. 1'''.

Hæc species *Pl. deflectum* Sayi in mentem vocat.

Hab. in Asiâ minore (H. Spratt).

16. PLANORBIS PHILIPPIANUS, Dkr. *Pl. testâ discoided, subnitidâ, tenuissimè obsoletèque striatâ, pallidè corned, diaphanâ, suprâ planatâ, medio impressâ, infrâ parùm concavâ; anfractibus senis rotundatis sensim crescentibus; aperturâ subrotundâ, subobliquâ.*

Diam. max. 5½''' ; alt. 1¼'''.

Patria Cochabamba in Boliviâ.

2. SOME OBSERVATIONS ON MYODES HUDSONICUS AND THE OTHER SPECIES OF THE GENUS MYODES. BY J. E. GRAY, ESQ., F.R.S. ETC.

The Governor of the Hudson's Bay Company having kindly sent to the British Museum the extensive series of Mammalia, Birds and Fish collected by Dr. J. Rae in his late very interesting journey, I have been induced to lay before the Society some remarks on the species of the genus *Myodes*, which I hope will tend to elucidate the history of these interesting animals.

Myodes Hudsonicus has been distinguished as a species by the large size and peculiar form of the claws on the front feet; but the specimen contained in this collection appears to prove that these large claws are only found in some individuals, or more likely in only one sex, and that the other individuals or sex have small, curved, sharp claws, like the typical species of the genus; and this also appears to be the case with *Myodes helvolus*, Richardson, for one specimen in the collection has the small typical claws which Sir John Richardson assigns to the species, and the other has very large, thick, rounded, bluntly truncated claws on the fore-feet, which is probably the character of the males.

The species of the genus in the British Museum may be thus divided:—

I. The upper cutting teeth narrow, smooth, without any longitudinal grooves. Thumb with a compressed, curved, acute claw.

a. Claws of fore-feet simple, curved.

M. Lemurus, two specimens; Sweden.

M. helvolus, Richardson, one specimen.

b. Claws of fore-feet of some (males?) specimens compressed above, with a round, dilated, expanded pad beneath.

M. Grænländicus. Fur with a dorsal streak.

c. Claws of fore-feet of some (males?) specimens very large, compressed, strap-shaped, and with a deep triangular notch at the end.

M. Hudsonicus.

II. The upper cutting teeth broader, with a central longitudinal groove; claws of the thumb strap-shaped, truncated, and notched at the tip.

M. helvolus, Rich. Claws of some specimens (males?) thick, subcylindrical, curved, truncate.

M. trimucronatus, Rich., two specimens. Claws of both specimens similar, acute, curved.

3. DESCRIPTION OF A NEW SPECIES OF ANATIFA. BY J. E. GRAY, Esq., F.R.S. ETC. ETC.

(See Annulosa, pl. 3. figs. 5, 6.)

In the collection of my friend Mr. Joseph Fryer, of Whitley House, Northumberland, I have observed a very interesting new species of this genus, which was given him by Mr. Hewitson, who found it attached to a *Gorgonia* in Madeira.

It is interesting as having the solid, thick, ventricose valves of Mr. Hinds's genus *Trilasmis*, and it also resembles that genus in the anterior basal and the upper opercular valves being very small, so that it forms the passage between *Pentalasmis* and that genus.

There are in Mr. Fryer's collection two specimens, which differ considerably from one another. One is pale red and elongate-ovate, smooth, rather compressed, and the larger opercular valves have a rather distinct line towards the extremity. The anterior basal valve is much-compressed. The second is yellowish white, pink at the base, ovate, swollen, slightly radiately and concentrically striated; the left larger opercular valve is larger than the right one, more convex, and partly inclosing it; the anterior valve and upper opercular valve are very narrow.

I propose to call the species *Anatifa crassa*. Peduncle short; valves thick, opaque, convex, large, the anterior basal valve and upper opercular valves very narrow.

Inhab. Madeira, on *Gorgonia*.

4. ON THALIELLA, A NEW GENUS OF CIRRIPEDES ALLIED TO SCALPELLUM. BY J. E. GRAY, Esq., F.R.S. ETC.

THALIELLA.

Valves 11; opercular valves subtriangular; dorsal elongate, curved; lower dorsal and anterior compressed, with two pairs of lateral valves in the middle of the body above the base. Peduncle with rings of imbricate horny scales.

This genus chiefly differs from *Scalpellum* in the front and hinder lateral pair of valves being each united into a single compressed valve, and in having no middle basal lateral valve.

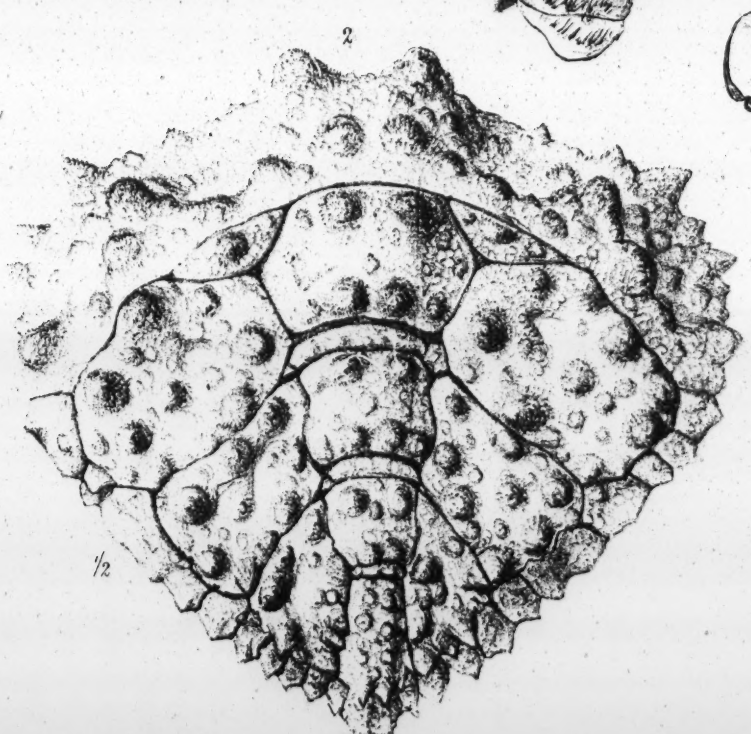
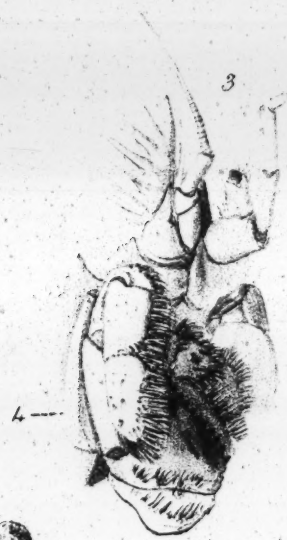
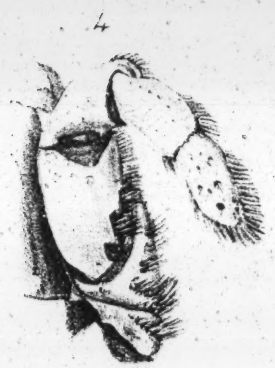
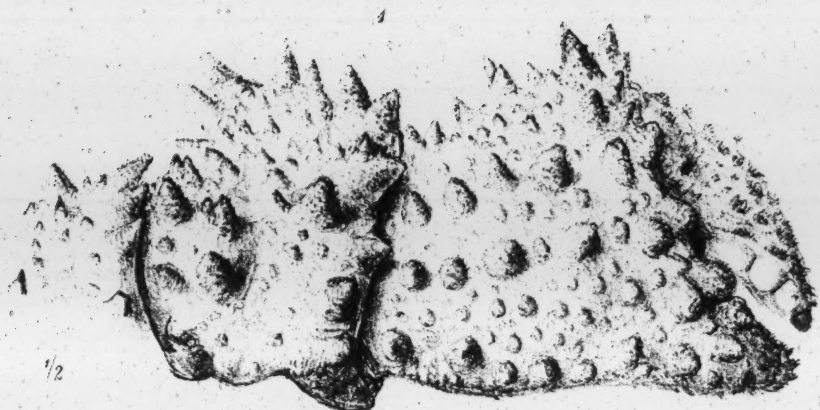
This genus was shown to me by Mr. J. S. Bowerbank, who received it from Algoa Bay attached to some species of *Plumaria*.

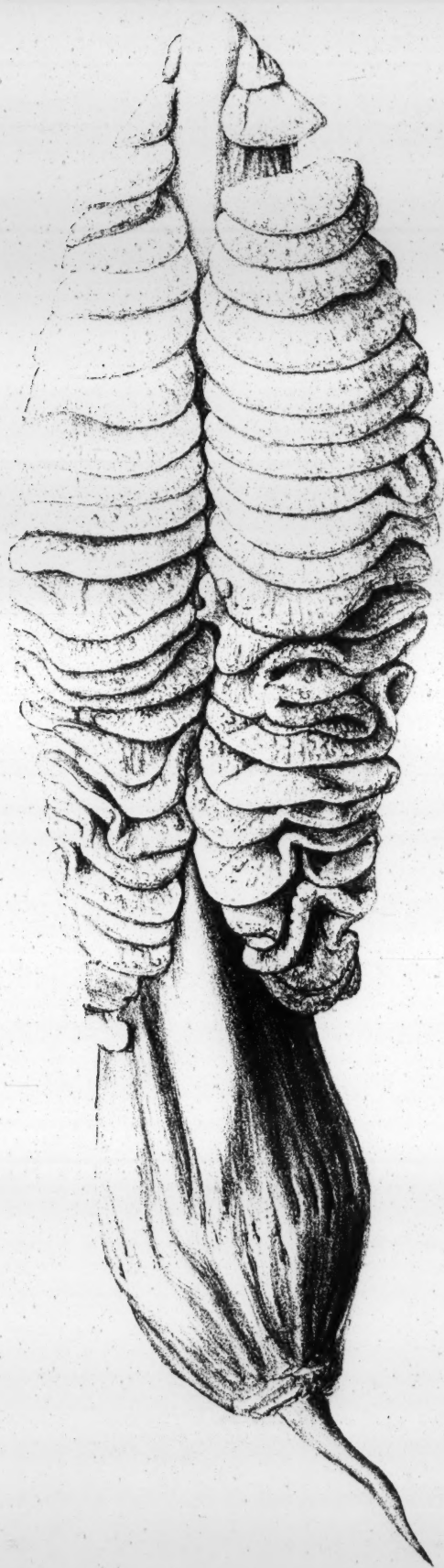
THALIELLA ORNATA.

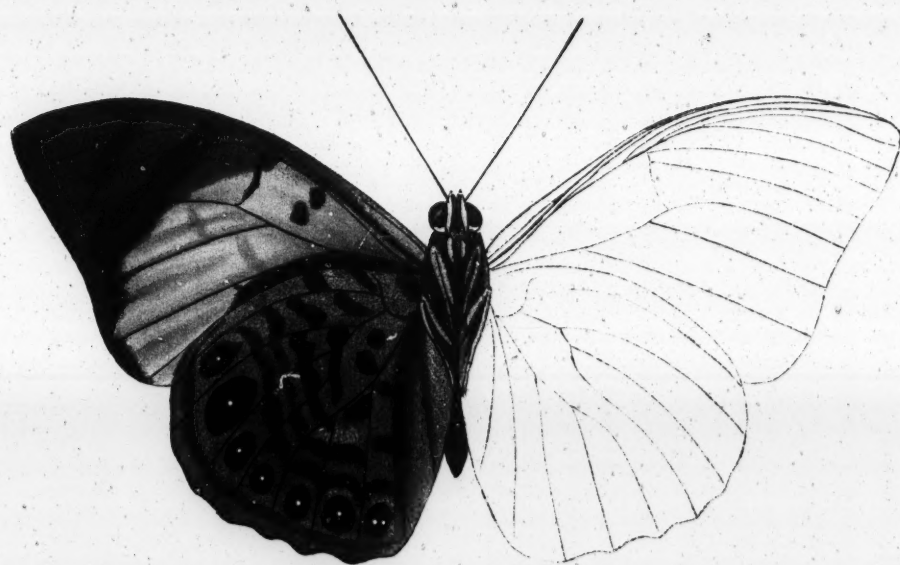
Pale horn-coloured, varied with red spots, or with a single red band on each side; valves horny, subpellucid, radiately striated.

On *Plumaria*, Algoa Bay, Cape of Good Hope. Presented to the British Museum by J. S. Bowerbank, Esq.

Stroem (*Nym. Saml. Danske*, 1788, 295, n. 111, f. 20) described a *Lepas testâ compressâ 7-valvis stipite lamellosâ*, found on *Gorgonia placomus* in the North Sea, which is probably allied to this genus.







W. C. Hewitson del et lith

Printed by Hullmandel & Walton

AGRIAS AEDON Hewitson.

5. DESCRIPTION OF SARCOPTILUS, A NEW GENUS OF PENNATULIDÆ.
By J. E. GRAY, Esq., F.R.S. ETC.

(Radiata, pl. 1.)

Sir William Jackson Hooker lately sent to the British Museum some bottles containing animals in spirits, some from New Zealand, others from South America, and some without any habitats: amongst the latter there is a fine specimen of a Sea Pen, resembling the true genus *Pennatula* in general form, but differing from it most essentially in the form of the *pinnæ* and their substance, and presenting a most interesting new form in the family.

Each of the *pinnæ* resemble the frond of *Renilla*, Lam.; they are placed in two crowded rows, one on each side of the upper part of the axis, and, like that genus, they have the polypes scattered over the upper surface of the *pinnæ*, which, as well as the surface of the stem, do not exhibit any spicula, but are smooth and fleshy.

This genus may be considered as the passage between *Pennatula* and *Renilla*.

SARCOPTILUS.

Coral pen-shaped; *shaft* thick, fleshy, attenuated towards the tip, smooth, slightly striated longitudinally, and granulose on the surface; *axis* subquadrangular, rather thick, flexible when moist, formed of concentric coats and longitudinal fibres. *Pinnæ* placed in two crowded rows, one on each side of one of the faces of the upper part of the shaft, kidney-shaped, crumpled, with the polypes scattered on the edge and upper surfaces, especially near the edge. *Polypes* small, when contracted leaving very small papillæ on the surface.

SARCOPTILUS GRANDIS.

Shaft very thick at the base, longitudinally striated. *Pinnæ* 25 on each side, the lower one smallest.

Hab. —? Brit. Mus.

Length 8 inches.

March 28, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were communicated to the Meeting:—

1. DESCRIPTION OF A NEW SPECIES OF BUTTERFLY, OF THE GENUS AGRIAS. BY W. C. HEWITSON, M.E.S. ETC.

(Annulosa, pl. 1.)

Genus AGRIAS, Boisd. MSS.

Head rather broad, clothed with hair; eyes nearly round or slightly

oval, prominent; maxillæ rather longer than the thorax; labial palpi rather widely separated, ascending, thickly clothed with scales, which in front are long; basal joint curved, very short, second more than twice the length of the first; third short, pointed. Antennæ elongate, about three-fourths the length of the body, gradually thickening from the base to the apex.

Thorax large, elongate-ovate, truncate posteriorly, hairy. Anterior wings subtriangular, the anterior margin rounded, about one-half longer than the outer, which is nearly straight or slightly sinuate; the inner margin rather longer than the outer, straight. Costal nervure stout, extending beyond the middle of the costa; subcostal nervure throwing off its first nervule about the middle, the second a short distance before the end of the cell, the third at some distance beyond the cell, the fourth rather more remote from the third than that is from the fourth. Third subcostal nervule terminating at the apex; fourth running close to the third until near the apex, then bent downwards and reaching the outer margin about half-way between the apex and the termination of the fifth subcostal nervule; upper disco-cellular nervule very short, middle above twice the length of the upper, lower nearly twice the length of the two other combined; third median nervule considerably curved. Posterior wings obovate; the fold for the reception of the body ample, anterior margin rounded, outer slightly dentate, sinuate; precostal nervure simple; cell closed by a slight disco-cellular nervule.

Anterior feet of the female small, the femur and tibia about of equal length, the tarsus short, four-jointed, the basal joint longer than the rest combined, which are all short, transverse, and nearly equal. Middle and posterior feet stout, rather short; the tibiæ spiny within, the spurs very short; the tarsi spiny at the sides, the first joint spiny below also, equal in length to the rest combined; claws small, curved; pulvillus large.

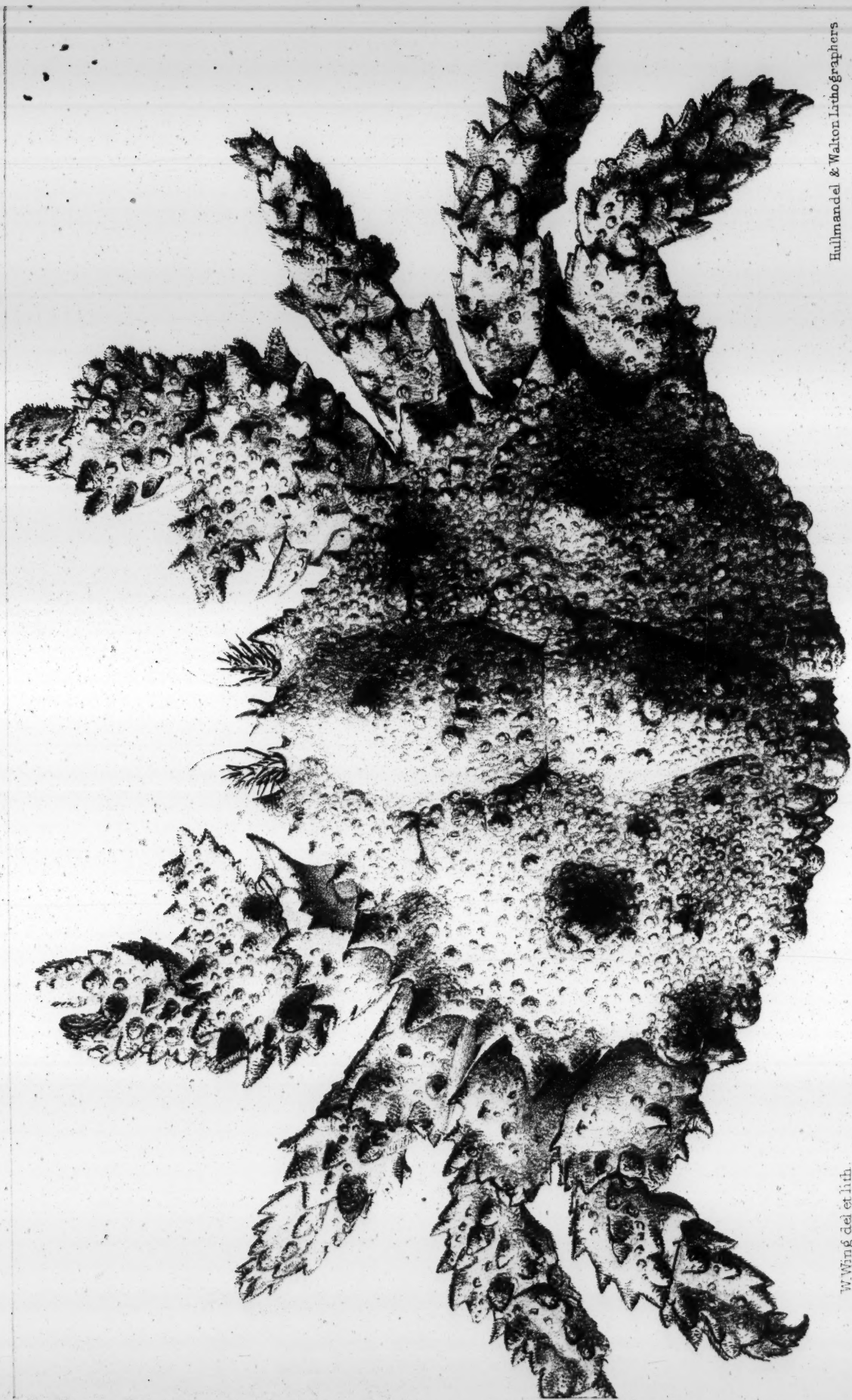
Abdomen short, tapering.

AGRIAS ÆDON. *Ag. alis anticis suprâ latè chermesinis, apice marginæque interno nigro, posticis suprâ nigris playâ magnâ, cyanâ, subtùs fuscescentibus, ocellis septem submarginalibus nigris, albo pupillatis.*

Exp. alar. 3 unc. 9 lin., vel 95 millim.

Hab. Nueva Granada.

Above, anterior wings rich crimson, the costal nervure and the inner margin fuscous black, the apex broadly and triangularly black, the black colour commencing on the costa opposite the end of the cell, becoming narrower towards the outer angle, where it unites with the fuscous black of the inner margin. Posterior wings black, marked with a large blue discoidal patch, extending nearly to the anal angle. Below, anterior wings with the part corresponding to the crimson of the upper surface much paler than above, the cell with two round black spots; the black of the apex and inner margin replaced by pale fuscous; the disco-cellular nervules marked with a fuscous black dash, and the apex crossed by two oblique bands of the same colour.



Hullmandel & Walton Lithographers

ECHIDNOCERCUS CIBARIUS White.

W. Wing del et lith.

Posterior wings pale fuscous, with two rounded fuscous spots in the cell; several scattered lituræ of the same colour before the middle of the wing, then two transverse bands also fuscous, followed by a series of seven black spots pupilled with white, the last bipupillate, the second spot the largest: between these spots and the margin a third fuscous band.

Head, thorax and abdomen black.

The beautiful butterfly which I have drawn is I believe unique in my own collection. It was taken by my friend Mr. Empson many years ago in South America, and was one of a very few things—all at that time very rare—which were saved from the shipwreck of a large collection.

Mr. E. Doubleday, whose experience gives him great facility, has kindly supplied me with the generic characters.

2. DESCRIPTION OF *ECHINOCERUS CIBARIUS*, A NEW SPECIES AND SUBGENUS OF CRUSTACEA. BY ADAM WHITE, F.L.S. ETC.

(Annulosa, pl. 2, 3.)

Amongst the Decapod Crustacea there are several genera of doubtful situation which belong to neither of the great divisions *Brachyura* and *Macroura*. Professor Milne-Edwards first brought them together as a section, under the name of *Anomoura*; but, as he remarks, they do not form a very natural group, the principal advantage derived from its formation being the opportunity which it gives the systematist to withdraw all the aberrant species from the two very natural sections specified above. Not a year passes but new species are added to this group, and occasionally a new form is found; in course of time these discoveries will serve to link genera which seem at present to be distant from each other, if at all related. The species described below is close to the genus *Lithodes*, some of the species of which have considerable resemblance to it. The generic name describes the peculiarity of the spined appendage to the outer antennæ, while the specific name is given in allusion to its excellence as an article of food.

In one of the two specimens in the British Museum, the legs, carapace and abdomen are covered with numerous barnacles, and on taking off the old carapace, which had commenced to split, the still coriaceous envelope, which would have formed the new carapace, may be found beneath it. On this are very plainly indicated the crowded warts, the scattered knobs, and lateral projecting spines, which are so prominent on the outer surface of the old carapace. The different regions of the carapace are also clearly distinguished: the body of this new carapace is coriaceous; the warts are more calcareous, and consist for the most part of small irregularly-shaped plates, arranged circularly round a small group of calcareous scales. These groups are of different sizes, from that of the head of a small pin to the space occupied by the top of a tolerably large nail. On a small portion of the carapace, on each side of the middle knob, and

in two lines directed towards the front, there are distinct portions of calcareous matter already formed, while on the abdominal plates there are still more extensive calcareous portions formed in the corium; the various groups of plates are distinctly visible, most of the scales are perforated, and through the holes in many cases a short hair or bristle protrudes. This new skin is only visible on the carapace and on the abdominal plates.

ECHINOCERUS (LITHODES) CIBARIUS.

Carapace considerably wider than long, subtriangular, very irregular above; the front sinuated, with a large projecting pointed beak springing from the middle, and armed above with three or four spines arising from one knob; the sinus on each side has three spines, the outer one very large and projecting; edge of the carapace more or less spined all round, the spines on the latero-anterior ridges being sharp, those on the latero-posterior and posterior edges being blunt; the latero-anterior and latero-posterior edges separated by a deep notch; general surface of carapace closely covered with tubercles, which are perforated, and furnished with bristles springing from the holes; on the stomachal region there is a high conical projection, the sides of which are comparatively smooth; near the base of this on each side is a smooth somewhat oval wart, with an impressed line behind it; on each branchial region a high conical projection, and another behind the middle of a straight line drawn between the branchial tubercles; the posterior edge of the carapace with two rather large tubercles separated by a slight sinus.

Chelæ with the end of the fingers hollowed out somewhat like a spoon, the edges granulated, the hands with numerous large bristly pointed tubercles on the outside, three of these being on the upper edge; the wrist with a large triangular expansion on the inside, which is spined and tubercled above; second, third and fourth pairs of legs nearly as long as the first pair, and very similar in appearance, but not so thick; the third joint from the tarsus flat on the sides; the upper surface of the legs with large conical bristly tubercles or spines; the spines on the tibial joint arranged in three longitudinal lines; the tarsus spined, particularly on the lower edge; fifth pair of legs quite concealed within the branchial cavities.

Outer antennæ with a large appendage at the base; this appendage is smooth below, and has four longitudinal rows of spines on its upper portion, the lateral rows having the longest spines.

Inner antennæ situated beneath and to the outside of the eyes; the first joint very thick, particularly at the base, subcylindrical; second and third joints cylindrical, nearly equal in length, thickest at the tips.

Eyes close together, placed under the frontal spine; the peduncle is much shorter than, and not nearly so thick as, the basal joint of inner antennæ; the upper side covered with small spines.

Outer jaw-feet resemble those of *Lithodes*, especially in *L. brevipes*.

Abdomen very wide, rounded at the base, triangular at the end, formed of many plates of different sizes, which are close together;

the basal segment is crescent-shaped, and within its sinus are included the other plates, which are arranged in four longitudinal series; the outer series narrow, the other three wide; the plates of different sizes and shapes, with two supplemental plates, one on each side of the central row, and at its base; the plates with rough and bristly tubercles; the first joint of abdomen with two round depressions, the base of each being coriaceous-like, and furnished with only a few small scattered calcareous tubercles; the middle of the hind-edge with four tubercles placed in pairs.

Hab. North America, mouth of the Columbia River; Sir George Simpson. In Mus. Brit.

3. DESCRIPTIONS OF NEW SPECIES OF TURBO, CHIEFLY FROM THE COLLECTION OF HUGH CUMING, ESQ., F.L.S. BY LOVELL REEVE, F.L.S. ETC.

TURBO NATALENSIS. *Turb. testâ vix imperforatâ, orbiculari, depressiusculâ, anfractibus spiraliter sulcatis, sulcis regulariter concavis latiusculis; olivaceo-viridescente, rufo radiatim maculatâ et punctatâ, intus argenteâ; operculo testaceo, cristato.*

Hab. Port Natal; Wahlberg.

The operculum of this beautiful species is a tufted mass, like that of the *T. sarmaticus*.

TURBO SAXOSUS. *Turb. testâ imperforatâ, ovatâ, spiræ suturis subprofundè impressis; anfractibus supernè concavo-declivibus, medio angulatis, transversim obscure liris, tuberculis juxta suturas coronatis, infra nunc muticis, nunc tuberculis bi-tri-seriatim armatis, laminis subtilibus, longitudinaliter obliquis, peculiariter exsculptis; viridi albimaculatâ, intus argenteâ; operculo testaceo, crasso.*

Hab. West Columbia; Cuming.

Having observed this species in a private collection, under the name *saxosus*, in manuscript, I adopt it, though not a very appropriate one, lest it may have been published and escaped my observation. The rows of tubercles are extremely variable, being even more prominently developed in specimens of smaller growth than is here represented.

TURBO LAMINIFERUS. *Turb. testâ umbilicatâ, ovatâ, spiræ suturis canaliculatis; anfractibus subtubulosis, spiraliter costatis, costis distantibus, et, cum interstitiis, pulcherrimè concentricè laminatis, aperturâ rotundâ; viridi, nigro longitudinaliter undatâ, intus argenteâ.*

Hab. Mouth of the Victoria river, New Holland.

A very beautifully sculptured species, allied to the *T. Ticaoicus*, but perfectly distinguished from it, in being of uniformly smaller size, more distinctly and remotely ribbed, and in being concentrically frilled throughout with a close succession of delicate laminæ.

TURBO MURREUS. *Turb. testâ minutâ, suborbiculari, vix umbilicatâ, lævigatâ, politâ, albâ, roseo nitidè maculatâ.*

Hab. —?

A minute, delicately coloured, porcelain shell.

TURBO CORALLINUS. *Turb. testá parvá, suborbiculari-ovatá, imperforatá, conspicuè spiraliter sulcatá; roseo-purpureá, intùs margaritaced.*

Hab. — ?

Another interesting small species, of a dull livid rose-purple hue, strongly spirally grooved.

TURBO TROCHOIDES. *Turb. testá subpyramidali-ovatá, perforatá; anfractibus spiraliter sulcatis, supernè concavis, deinde obsolete nodosis; luteo-albicante, olivaceo radiatim maculatá, lineolis minutissimis aurantio-fuscis, obliquè reticulatis.*

Hab. — ?

A species of peculiar sculpture and marking, partaking very much of the generic character of *Trochus*.

TURBO PUSTULATUS. *Turb. testá ovatá, subventricosá, imperforatá, nodis grandibus papillois undique notatá, aperturæ fauce argentæ; albidá, olivaceo-fusco luteoque maculatá.*

Hab. — ?

An interesting species covered with swollen nodules; collected by Sir Edward Belcher during the voyage of the 'Sulphur.'

TURBO TURCICUS. *Turb. testá subpyramidali-ovatá, imperforatá, spiræ suturis excavatis, anfractibus spiraliter squamato-liratis, supernè declivibus, acutè angulatis, ad angulum erecto-squamatis, aperturá parvá, lutescente, coccineo rufo pulcherrimè radiatá.*

Hab. Philippine Islands; Cuming.

A prettily painted species encircled by a diadem of erect scales.

TURBO PYROPUS. *Turb. testá subdepresso-ovatá, imperforatá, spiræ suturis simplicibus, anfractibus lævibus, striisve spiraliter cingulatis; albidá, striis vividè rubris, intùs argentæ.*

Hab. — ?

Of a deep blood-red colour, with the margins of the aperture united beyond the columella.

TURBO GEMMATUS. *Turb. testá subdepresso-ovatá, imperforatá, spiræ suturis subprofundè canaliculatis, anfractibus nodulis parvis undique gemmatis; corallo-rufescente, intùs argentæ.*

Hab. — ?

Very similar in form to the preceding species, and partaking in some measure of the colour; the spire differs in having the sutures deeply channeled, and the entire surface in being beaded with small papillose nodules. In the former species the margins of the aperture are entire, and it is the striæ that are coloured upon a white ground.

TURBO LUGUBRIS. *Turb. testá suborbiculari-ovatá, spirá depressá, anfractibus supernè declivibus, deinde nodulis papillois cingulatis, columellá concavá; albidá, epidermide crassá nigricante indutá, columellá et aperturá argenteis.*

Hab. — ?

Another species collected by Captain Belcher in the 'Sulphur,' not hitherto described.

TURBO NIVOSUS. *Turb. testá oblongo-turbinatá, imperforatá, spirá subexsertá, anfractibus spiraliter liratis, liris obtusis, irregularibus, duabus prominentibus subsquamosis; vividè virescente, fusco hic illic maculatá, liris prominentibus et inferioribus fusco niveoque articulatis, intùs argenteá.*

Hab. Philippine Islands; Cuming.

A prettily painted species, apparently not described before.

TURBO TUMIDULUS. *Turb. testá ovatá, imperforatá, spirá subacuminatá, anfractu ultimo amplo, tumidiusculo; anfractibus undique spiraliter liratis, liris angustis, confertis, valde irregularibus, obliquè serratis; lutescente, intense castaneo-nebulatá.*

Hab. — ?

This species merges into the *T. spinosus*, but is very remotely connected with it.

TURBO CIRCULARIS. *Turb. testá suborbiculari, imperforatá, spirá breviusculá, anfractibus supernè depressis, liris obtusè nodiferis, alternatim majoribus, cingulatis; rosaceo-fusco alboque marmoratá, columellá plano-concavá, albá, intùs margaritaced.*

Hab. — ?

Very nearly allied in form and general aspect to the *T. Natalensis*, but readily distinguished on comparison.

TURBO PORCATUS. *Turb. testá orbiculari, spirá depressiusculá, suturis excavatis, subtùs concavá, profundè umbilicatá, anfractibus fortiter spiraliter costatis, costis rotundatis, lirá minutá interveniente; viridi, rufo-olivaceo nitidè marmoratá, intùs argenteá.*

Hab. Point Swan, North Australia; Dring.

Allied in form to the *T. versicolor* and *porphyrites*, from both of which species it is sufficiently distinguished by its strongly-ribbed growth.

TURBO ARTICULATUS. *Turb. testá ovatá, vix umbilicatá, spirá acuminatá, anfractibus subtubulosis, spiraliter obtusè costatis, costis irregularibus longitudinaliter creberrimè serrato-striatis; viridi purpureo-nigricante marmoratá et variegatá, intùs argenteá.*

Hab. — ?

Allied to the *T. radiatus* in form, but peculiar in its articulated style of painting.

TURBO JAPONICUS. *Turb. testá ovatá, imperforatá, tenuiculá, subinflátá, anfractibus lævibus, spiraliter costatis, costis nunc prominentibus, regularibus, nunc planiusculis, valde irregularibus; spadicæo-luteá, rufo variè tinctá et maculatá, intùs argenteá.*

Hab. Japan.

Like most shells from the Japanese islands, this is of very peculiar character, and very different from any of the tropical species of the genus.

TURBO MILITARIS. *Turb. testá ovatá, imperforatá, tenuiculá, subventricosá, anfractibus lævibus, supernè declivibus; rufescente*

albida, maculis lineisque rufis nitide picta; columellæ margine livido-cinereo, intus argenteo.

Hab. Isle of Annaa (on the reefs); Cuming.

An interesting species of rather light growth, exhibiting a very distinct and characteristic style of painting.

TURBO HISTRIO. *Turb. testâ subglobosâ, tumidâ, imperforatâ, spiræ suturis excavato-canaliculatis, spiraliter liratis, liris subtilissime laminiferis, squamatis, squamis fortibus, erectis; nived, aurantio-ferrugineo late radiatâ, intus argenteâ.*

Hab. — ?

A shell of ventricose growth, strongly scaled, whilst the entire surface is very minutely laminated.

TURBO FLUCTUATUS. *Turb. testâ transversè ovatâ, crassiusculâ, subventricosâ, imperforatâ; anfractibus lævibus, supernè rudè angulatis, ad angulum obsolete nodosis, infrâ liris plano-obtusis, hic illic ferè evanidis cingulatis; columellâ concavâ; olivaceâ, lineis niveis viridi-umbratis, acutè undatis conspicuè longitudinaliter pictâ, intus argenteâ; operculo testaceo, spiraliter sulcato, medio subtilissime granuloso, marginem versus multiserrato.*

Hab. Punta, St. Elena, West Columbia; Cuming.

An extremely interesting species, which, though of rare occurrence, has long been known to me by the above name: from whom it received that appellation, which is very characteristic, I cannot, however, learn. It is a shell of solid growth, somewhat rudely noded, and obscurely flatly ridged. The ground-colour is that of a livid olive, very conspicuously marked with numerous zigzag lightning-like streaks of bright body-white, shaded with dark green.

The operculum is remarkable: testaceous and strongly spirally grooved, the innermost groove is broadly excavated, and the central mass is solid and minutely granulated, whilst the portion without the broad groove is arranged in numerous concentric, finely-serrated laminae.

Mr. H. N. Turner communicated to the Meeting the result of his observations on the motions of flexion and extension in the wings of Birds.

Mr. Griffith communicated a notice of the habits of a Beaver which had lived in confinement for the long period of fourteen years, most probably in consequence of its being placed in a dry and warm habitation, with occasional access to water.

April 11, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following paper was read to the meeting:—

SUPPLEMENTARY NOTE ON THE GREAT CHIMPANZEE (*TROGLODYTES GORILLA*, *Savage*, *TROGL. SAVAGEI*, *Owen*). BY PROFESSOR OWEN, F.R.S. ETC.

Since the communication of my description of the skulls of the great Chimpanzee of the Gaboon district, I have received from an esteemed correspondent, Dr. Wyman, Professor of Anatomy in Harvard University, United States, and a most accomplished anatomist and physiologist, a copy of his description of the parts of the skeleton of the great Chimpanzee which Dr. Savage had taken with him on his return to America, together with a preliminary and highly interesting sketch of the natural history of the species by its discoverer, who proposes to call it *Troglodytes Gorilla*, adopting the term used by Hanno in describing the wild men which he discovered on the coast of Africa during his famous voyage*.

Dr. Wyman gives dimensions of the skulls of a male and female *Troglodytes Gorilla*, with comparative measurements of a characteristic skull of a negro, and those of the *Troglodytes niger* and *Simia satyrus* (Sumatran variety, or *S. Abelii*) from my Memoir in Trans. Zool. Soc. vol. i. p. 374; and he sums up the following points as showing that from the *Troglodytes niger* the *Trogl. Gorilla* "is readily distinguished—

- " 1. By its greater size;
- " 2. By the size and form of the supraciliary ridges;
- " 3. By the existence of the large occipital and interparietal crests in the males, and by rudiments of the same in the females;
- " 4. By the great strength and arched form of the zygomatic arches;
- " 5. By the form of the anterior and posterior nasal orifices;
- " 6. By the structure of the infraorbital canal;
- " 7. By the existence of an emargination on the posterior part of the hard palate;
- " 8. The incisive alveoli do not project beyond the line of the rest of the face, as in the Chimpanzee and Orang;
- " 9. The distance between the nasal orifice and the edge of the incisive alveoli is less than in the Chimpanzee;
- " 10. The ossa nasi are more narrow and compressed superiorly."

The 5th, 7th and 9th are the characters which are most decisively repeated in the Bristol specimens of the skulls of *Trogl. Gorilla*, and are those that are least ascribable to age or the operation of external

* See the passage cited at p. 13, 'Falconer's Translation of the Voyage of Hanno,' London, 1797.

circumstances tending to produce a stronger variety of Chimpanzee. The value of the character from size is established by the concurrence of the foregoing more fixed ones. The supraciliary ridges are relatively as strongly developed and as prominent in the skull of a female adult *Trogl. niger* as in that of the *Trogl. Gorilla*, and they are as angular and rough or uneven in the skull of the adult male *Trogl. niger* as in that of the adult male *Trogl. Gorilla*. The male *Trogl. niger* shows also the median prominence between the orbits above the root of the nose.

In six skulls of *Troglodytes niger* Dr. Wyman found that "the temporal ridges are generally separated from each other by a space varying from half an inch to one or two inches, according to age, but in none of them is to be seen even a rudiment of the interparietal ridge." In an adult, but by the condition of the teeth, not old male *Trogl. niger*, the temporal ridges have met above the obliterated suture, and developed the rudiment of an 'interparietal ridge,' which would probably have risen above its rudimental state had the exercise of the large temporal muscles been longer continued. Processes, ridges and crests dependent upon the stimulus of muscular action for their development, are the seats of most variety, and the least safe or satisfactory osteological marks of specific distinction. In the great males of the *Tr. Gorilla* even a certain range of variety is presented by the skulls of the four adult males, which we are now able to compare.

In the one described by Dr. Wyman the interparietal or sagittal crest is elevated about $1\frac{1}{2}$ inch above the skull, and terminates above in a thin and free edge: in the fine male skull figured, and in the older male's skull, the two temporal ridges, though touching each other at their base, do not coalesce to form a single sagittal crest, but each terminates in a free edge, inclining from its fellow, and neither of them rise to half an inch at their highest part, three inches behind their point of contact.

4. The specific character of the zygomatic arches is best shown by the depth and convex or angular upper contour of the squamosal portion of the arch.

5. Dr. Wyman has well indicated the characteristic forms of the anterior and posterior nares; and the conformity of the four skulls, two males and two females, submitted to his able and scientific scrutiny, in this important character, with the three skulls which I have described, adds to our confidence in its constancy and value. The observed range of variety does not materially affect the well-marked difference of form in the posterior nares. Dr. Wyman finds in the *Tr. niger* that "the transverse diameter of the orifice exceeds that of the vertical, but in the *Tr. Gorilla* the vertical is twice that of the transverse, a condition which results from the elongation downwards of the superior maxillary bones." In one skull of an adult female *Trogl. niger*, in the Bristol Museum, the vertical diameter equals the transverse diameter of the posterior nares, and it exceeds it by about one-half only in the three skulls of the *Tr. Gorilla* in the same museum.

6. With regard to the sixth character, which was pointed out to

Dr. Wyman by Prof. Agassiz, it is stated that "in the Chimpanzee the infraorbital canal forms a deep groove, terminating in the sphenomaxillary fissure, its depth remaining uniform to its termination; but in the Engé-ena (*Trogl. Gorilla*) the canal becomes gradually less deep from before backwards, and at the fissure is scarcely obvious." In the skull of the female *Trogl. Gorilla* (fig. 2) examined by me, the infraorbital canal is also shorter and shallower than in the skull of a female *Trogl. niger*, but the varieties observable in the condition of this canal in different individuals of the *Trogl. niger* are more marked than those above noticed in the skulls of the two species, and induce me therefore to attach less importance to this character as a specific one. In two skulls of adult males, *e. g.* in the College of Surgeons, the infraorbital groove as it passes backwards again becomes a canal by the meeting, and in one specimen by the coalescence of the two sides of the groove above the canal for an extent of from two to three lines before it enters the sphenomaxillary fissure. Dr. Wyman indeed notices a similar conformation in an adult cranium of the Chimpanzee belonging to Dr. J. C. Warren. Now this is a more decided difference from the continuous open groove at the floor of the orbit in the adult female *Tr. niger* than that groove presents in comparison with the shorter and shallower one in *Trogl. Gorilla*. I find too that the second character of *Trogl. Gorilla* pointed out by Prof. Agassiz,—“from the internal walls of the orbits which recede from each other in descending towards the floor, thus leaving a large pyramidal space for the lodgment of the os ethmoides,”—is so much less marked in the female skull of *Tr. Gorilla*, as contrasted with that of *Tr. niger*, as to induce me to view it more in the light of a sexual than a specific modification.

The seventh is a good character, and is repeated by each of the skulls of *Tr. Gorilla* examined by me. All the skulls of *Tr. niger* also show the backward projecting point, where the emargination exists in *Tr. Gorilla*.

8. The minor relative projection of the incisive alveoli beyond the line of the rest of the face is as characteristic of the three skulls of *Tr. Gorilla* now in England as of the four in the United States, and results from the same comparative shortness of the premaxillary bones, between the nasal orifice and the edge of the incisive alveoli. But the ossa nasi, besides being more narrow and compressed superiorly, are more prominent at that part in *Tr. Gorilla* than in *Tr. niger*, and they are also more expanded and broader inferiorly, and I cannot but regard the most decisive mark of the specific distinction of the *Troglodytes Gorilla* to be the longer persistence of the maxillo-premaxillary sutures, and the evidence thereby given of the peculiar form, development and connexions of the upper portions of the premaxillary bones. It is remarkable indeed, since these sutures remain so distinct in the adult female skull (fig. 2) and the younger adult male skull (fig. 1) here described, that no trace of them should have been detected in any of the four skulls taken by Dr. Savage to America, in which Dr. Wyman describes the *ossa nasi* as being “firmly co-ossified with each other and with the surrounding bones.”

The triangular expanded facial part of the upper end of each pre-maxillary intervening between the nasal and maxillary bones will always serve to distinguish the cranium of an immature *Trogl. Gorilla* from that of a *Trogl. niger*.

May 9, 1848.

W. Yarrell, Esq., V.P., in the Chair.

Letters were read from Captain Hope, R.N., dated Rio Janeiro, February 23, and from Mr. Bridges, Corr. Memb., dated Valparaiso, Feb. 27, 1848.

The following communications were made to the Meeting:—

1. NOTICE OF A NEW SPECIES OF MONKEY FROM ANGOLA, LIVING IN THE GARDENS OF THE SOCIETY. BY J. E. GRAY, ESQ., F.R.S. ETC.

(Mamm. pl. 3.)

The Society has recently procured a Monkey from Angola, which bears some resemblance to the Diadema Monkey which M. F. Cuvier erroneously described and figured as the female of *Cercopithecus Diana*, but it differs from that species in the lips being black, like the face, and only covered with very short whitish hairs; and also in being much darker coloured; and this blackness has increased since it has been in the possession of the Society and obtained a better fur. At first sight I thought that it might be a melanism of some other species; but on comparing my notes with the specimens in the British Museum collection, I am convinced that it is different from any I have before had the opportunity of examining.

It belongs to the division of the genus *Cercopithecus* with rounded whiskers formed of annulated hairs, which have no beard, a variegated fur, and black nose and lips, and is easily distinguished from the species of that division by its dark colour and broad frontal band. I propose to call it

The Pluto. *Cercopithecus Pluto*.

Sp. ch. Black; the hair of the broad frontal band, ringed with white; the large rounded whiskers, the back, the upper part of the front of the sides, and the base of the tail, ringed with varying greenish white; the distal half of the tail black; the face and lips black, with short, scattered white hairs.

Inhab. Angola.

This species is easily known at first sight by the deep black colour of the back of the head, and limbs, and the broad white frontal band: the large mantle-like patch of minute, white, grised hairs on the



back, and the large size of the black and white ringed whiskers, giving the whole animal a very striking appearance.

The tail at this time is not in very good condition, and the end appears to have been destroyed.



2. OBSERVATIONS ON SOME BRAZILIAN BATS, WITH THE DESCRIPTION OF A NEW GENUS. BY J. E. GRAY, ESQ., F.R.S. ETC.

Having lately received from Hamburg a collection of Bats from Brazil, containing several species which I have not before seen, I beg to lay some observations on them before the Society.

I may premise that they were all named, on what authority I know not, and referred to described species, but several of them do not agree with the specimens which I have received with the same names before, nor with the original descriptions.

ARCTIBEUS LEUCOMUS, n. sp..

Grey brown, paler beneath; axilla whitish; tuft of hair on the side of the neck, near the shoulders, pure white; hair of back grey brown, with darker tips; the arms, and upper and lower surface of membranes near the sides, hairy; the interfemoral membrane rather wide, hairy above; nose-leaf ovato-lanceolate, longer than broad,

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with a thick midrib; ears rather large, rounded; tragus oblong, toothed on the outer side.

Inhab. Brazils.

I received this specimen under the name of *Phyllostoma brevicaudatum*, but it cannot be of that species, as it has no appearance of any tail. It agrees with *P. Newwied's* figure in having a rather wider interfemoral membrane than the other *Arctibei*, but it differs from it in the membranes being much more hairy, and in the absence of the peculiar white, epaulet-like spots.

Length of tarsus $7\frac{3}{4}$ ''' ; foot 5''' ; wing-bone 1" 5''' ; thumb 6'''.

NYCTIPLANUS, n. g.

Tail none; interfemoral membrane none; head short; nose-leaf lanceolate, erect; lower lip entire, with a triangular group of warts in front; cutting teeth $\frac{2}{4}$; ears lateral, separate; tragus denticulated; wings broad; index finger one-jointed, middle finger four-jointed; thumb elongate, lower joint short, inclosed, upper joint elongated, slender, free; feet moderate, toes equal, compressed.

This genus has the same kind of nose-leaf as *Phyllostoma*, but differs from all the genera with that form of nose-leaf in having no interfemoral membrane. In this character it agrees with *Diphylla* and *Stenodema*; but these genera only have a scarcely elevated nose-leaf.

NYCTIPLANUS ROTUNDATUS, n. sp.

Dark brown, beneath paler; hair yellowish brown, with dark tips; of the under side paler, with pale tips; of the sides of the body dark blackish brown; the fore-arm above and below, and the upper part of the wing-membranes near the body and on the side of the legs hairy; nose-leaf ovate, lanceolate, about as long as broad; apex acuminate; ears rather acute, naked; tragal lanceolate, acute.

Inhab. Brazils.

Length of wing-bone 1" $7\frac{1}{2}$ ''' ; tarsus $8\frac{1}{2}$ ''' ; foot 5''' ; thumb 5'''.

I received this specimen under the name of *Phyllostoma rotundatum*, which is probably the MS. name of some German zoologist.

3. DESCRIPTION OF A NEW HERON. BY JOHN GOULD, Esq., F.R.S. ETC. ETC.

ARDEA LEUCOPHÆA, n. sp.

Forehead and upper portion of the crest white; sides of the head and lower portion of the crest deep glossy black; neck white, washed with vinous, and with a series of lanceolate marks of black disposed alternately down the front; all the upper surface, wings and tail dark grey, the lanceolate feathers of the back fading into white; edge of the wings buffy white; primaries and secondaries dark slate-colour; flanks and under surface of the wing grey; chest and abdomen white, separated from the grey of the flanks by a series of black feathers; under tail-coverts and thighs white; bill yellow; tarsi olive.

The young differs in having the whole of the crown of the head

black; all the upper surface greyish brown; and the under surface striated with brown and white.

Total length 38 inches; bill 7; wing 19; tail $7\frac{1}{2}$; tarsi 5.

Hab. India and Australia.

Remark.—Having carefully compared examples of this species with the Common Heron of Europe, I find it differs from that bird in being altogether of a larger size, and that the line of the bill, instead of being straight, has an upward tendency; in other respects they are very similar.

4. ON THE HABITS OF *MABOUYA AGILIS*. BY P. H. GOSSE.

In the parts of Jamaica with which I am familiar, this pretty, active little Scink is abundant. It is most numerous in the lowlands, and on the gently-sloping hills of moderate elevation that form the characteristic feature of the southern side of that beautiful island. The fences there are largely composed of 'dry-wall,' built of rough unhewn stones, without cement. On these walls the *Mabouya* may be seen crawling, and often lying quite still in the sunshine; when alarmed it darts with lightning-like rapidity into one of the crevices which abound in all parts of such a structure. Indeed it rarely ventures far from some refuge of this kind, and I presume that the facilities for instant retreat afforded by these pervious walls are the chief cause of its preference for them. It is scarcely ever seen on the ground, except when avoiding danger; nor on the trunk or branches of trees or shrubs; but in the concavity of a pinguin leaf (*Bromelia pinguin*) it is occasionally observed to lie, basking in the sun.

The rounded form of the head and body, devoid of projections; the close-lying and glossy scales; the shortness of the legs, bringing the belly flat upon the ground; and its constant habit of resting with the chin on the ground also, give to the *Mabouya* an aspect very much unlike that of our other common lizards, and cannot fail to remind even the least observant of its affinity with the serpent-tribes. The negroes, in the recognition of this proximity, doubtless, have bestowed upon it the appellation of "Snake's waiting-boy," or more briefly, "Snake-boy." In the parishes of St. Elizabeth's and Westmoreland it is also frequently called the "Woodslave," though in other parts of the island this term seems to be applied to some of the *Geckotidæ*. From the shortness of its legs results also another resemblance to a snake, for owing to the shortness of the steps, if made only with the legs, it throws the shoulder and the hip forward at each step; and this throwing-out of the sides at different parts alternately produces a wriggling motion, somewhat serpentine in appearance.

The Woodslave is not very easily captured alive: the hair-noose so successfully used in taking our other small lizards I have always found to fail, if tried on this species; for though it is not difficult to pass the noose over the head (the reptile allowing this so long as its assailant's approaches and motions are deliberate and gentle), it is instantly slipped off again, because there is no sensible contraction

behind the occiput, and the scales lie too smoothly to afford the slightest hold. They are too wary and too swift to be caught by the hand. A smart tap with a switch, however, across the shoulders or the back disables them for awhile; but if the blow descend on the tail, that organ instantly separates, with the like brittleness, as in other lizards. Cats not unfrequently catch them.

The form of the scales and the manner of their apposition remind us of the fishes: they are convex above, concave beneath, are slightly attached to the skin, and lap over each other at the edges. The colours of the animal are produced by pigment deposited on the under surface of the scales, which in a scale recently removed is soft, and readily rubbed off: the skin beneath is black. The scales, which are subpentagonal, are marked with a series of regular lines, indented on both surfaces, connected by transverse ones, somewhat like the nervures in the wing of an insect; they lose themselves before they reach the hinder edge. The pigment is deposited in the centres of the areas formed by the lines. The scales from the back and from the belly are alike; but the postreme two-thirds of the tail are covered, both on the upper and under surfaces, by narrow transverse plates, which do not essentially differ however from the other scales, except in having a greater number of parallel depressed lines.



A scale, magnified.

The beautiful provision for protecting the eye without impeding vision, shown by the lower (and larger) eyelid having a sort of window, a transparent, glassy, circular plate in its centre, immediately opposite the pupil when the eye is closed, is well-worthy of admiration as an obvious example of creative wisdom and providential care. Habitually darting to and fro in the narrow crevices of walls and heaps of stones, the eyes of the Woodslave, if unprotected, might be continually liable to injurious contusions, while as it feeds on the insects, at least in part, that resort to such situations, undimmed vision would be essential to it while permeating them.

The Woodslave is viviparous. I first became aware of this fact by the dissection of a specimen killed on the 11th of February, in the abdomen of which were several oval sacs, about half an inch long, composed of a soft, transparent, very tender membrane, which displayed a foetus within each, far advanced to maturity. And on the 29th of April I killed another female, the abdomen of which was very much dilated: in this specimen I found four young, quite matured, and fully coloured, with a brilliancy indeed superior to that of the adult: they were enveloped in two sacs, but each foetus was inclosed in its own amnios besides, a very delicate membrane in which it lay coiled up; the vitellus not quite absorbed, but attached by the funis to the belly. There was also a portion of the tail of a fifth foetus, the body of which had probably been forced from the abdomen of the parent, through the wound which killed it. The young measured, from the muzzle to anus, $1\frac{4}{10}$ inch; thence to extremity of tail $1\frac{9}{10}$ inch. These two specimens, displaying the contents of the abdomen *in situ*, are now, with other specimens of both sexes, in the British Museum.

I afterwards found that this fact had not escaped the observation of the indefatigable Robinson; for, on consulting his manuscript volumes in Kingston, I met with the following notes, recorded nearly a century ago:—"No author that I have met with has observed that any animals of the Lizard-kind are viviparous; yet I have by accident discovered that the smooth Snake-lizard of Jamaica brings its young forth alive. Mr. Long having caught one of these alive, tied it all night upon a table with a thread, and in the morning found a young one or two lying near the other, which was a full-grown one. Being at a loss to account for this, as imagining that all the Lizard-kind were oviparous, he called upon me to know my sentiments. It appeared very plain to me that this animal was viviparous; nor does this seem strange to me, when I consider that some of the Serpent-kind are also viviparous, viz. the Viper and Rattle-snake.

"Some time in August 1760, as I was looking over a parcel of preserved lizards, finding amongst the rest one of these Snake-lizards full-grown, with the belly very much distended, in which state they may be often seen,—I took my penknife, and endeavoured to cut the abdomen open, but found it so well defended by a covering of very small hard scales, like those of a fish, that my knife would not enter till I had scraped them away, when opening the abdomen I found two beautiful young ones, about two inches long." (Rob. MSS. iv. 47.)

The stomach is a lengthened sac. In specimens that I examined I found small cockroaches, fragments of crickets, &c., insects which live in heaps of stones. In one specimen I observed a few slender, rather short, intestinal thread-worms, loose among the abdominal viscera.

Sloane's '*Lacerta minor lævis*' (tab. 273. fig. 5) is certainly the present species, and is not a bad representation. His description, however, like most of his zoological notes, is full of confusion and error. He says, "This is bigger than the former [which I think to be the female of the Purple-tailed Anolis*], smooth, having a great many brown spots, otherwise much the same [!], laying a very small, white, hard-shelled *egg* (fig. 6) [which is however the egg of a common little *Sphaeriodactylus*], nestling in rotten-holed trees [here he confounds it with *Gecko rapicauda*], leaping from one bough to another [here with the *Anoles*]; 'tis very common among old palisades, &c." It is very evident to me that Sloane's zoological notes were but in a slight degree the result of his own observation; he trusted to the loose reports of negroes and others, generally correct of something or other, but very often misapplied, the local names and habits of widely different species being huddled and mingled together in almost inextricable confusion. That fruitful source of error, the application of the same names to different species in different (and sometimes in the same) localities, to which I have alluded in my '*Birds of Jamaica*,' p. 177, against which a naturalist should always be on his guard in a foreign country, appears to have misled our venerable naturalist. Nor does it seem to me disrespectful to the name of that great man thus to expose his mistakes, since I feel able

* I hope to describe this species in a future memoir.—P. H. G.

to speak positively, from long-continued and familiar personal observation, and because precision in the narration and application of facts is of the highest importance in natural science.

I subjoin a description, noted from the living animal. Head, neck and fore-part of back, reddish brown, bronzed; a broad band of black runs from the muzzle on each side, inclosing the eye, and passing down to the hind-leg; this band is bounded, both above and below, by a band of yellowish white, gradually becoming obsolete between the fore- and hind-leg; each of these pale bands is again bounded by a line of black, more or less interrupted or maculate, the superior of which extends along the tail; lower back and tail, greenish brown; whole under-parts greenish white, silvery; upper surface of the limbs and feet black, with pale confluent spots. The whole animal reflects a metallic gloss. There is no appreciable difference in the sexes.

Dimensions of one measured, a gravid female, of rather large size:—Length, muzzle to anus $3\frac{7}{10}$ inches; tail $5\frac{1}{4}$: total nearly 9 inches. Muzzle to eye $\frac{5}{10}$ in.; muzzle to ear $\frac{7}{10}$ in.; muzzle to front of fore-leg $1\frac{2}{10}$ in.; axilla of fore-leg to front of hind-leg 2 in.; fore-leg, from axilla to tip of claws, $\frac{9}{10}$ in.; hind-leg $1\frac{3}{10}$ in.

This is the only species of *Mabouya* that I found in Jamaica. Is *M. Sloanei* (Dum. et Bib.), which is ascribed to the same island, really distinct?

May 23, 1848.

R. C. Griffith, Esq., in the Chair.

A letter was read from the Hon. J. Thomason, dated Agra, March 21, 1848, in which he informed the Secretary that in the course of an official tour made in the previous year to Almorah in Kumaon, he had learnt that some Butias had brought down a young Kiang (*Equus hemionus*) to the fair at Bugesur, a few miles from Almorah. Having succeeded in purchasing this animal, Mr. Thomason forwarded him to Allahabad and Calcutta, made arrangements at the latter place for his transport to England by the earliest opportunity, and directed his agents to present the animal on his arrival for the acceptance of the Society, to whose collection Mr. Thomason trusted that he would form a desirable acquisition. The letter contained a clever sketch from life, and the following

“ Principal measurements of the Kiang.

	ft.	in.
Height to withers.....	3	10
Height behind.....	3	$11\frac{3}{4}$
Depth of chest.....	1	$7\frac{1}{4}$
Girth of body below chest.....	3	$11\frac{1}{4}$
Length of head from muzzle to top of forehead....	1	8

	ft.	in.
Length from forehead to point of shoulder	1	11
Length from point of shoulder to tail	3	0
Breadth between eyes across head	0	8
Length of ear	0	8 $\frac{1}{4}$

"He is a stallion, and has a broad dark stripe down the back, and a fainter stripe across the shoulders.

"He is said to be about a year and a half or two years old, and was caught when very young by a Hunia.

"He is not nice in his food, and is perfectly tame. He is not at all timid, but in stubbornness and obstinacy surpasses even the common ass. In order to save him from the ill-treatment and injury to which his stubbornness would expose him, a poney was provided to accompany him to Calcutta. When this poney was led in front, he followed quietly; but when alone, he could with difficulty be made to move a single step."

After some remarks by Mr. Gray and other Fellows of the Society on the interest with which Mr. Thomason's specimen of the Kiang would be received in this country, the following paper was read.

OBSERVATIONS RELATING TO SOME OF THE FORAMINA AT THE BASE OF THE SKULL IN MAMMALIA, AND ON THE CLASSIFICATION OF THE ORDER CARNIVORA. BY H. N. TURNER, JUN.

Of all those parts of an animal frame to which the zoologist may direct his search for characters truly indicative of the affinities of the species, or of the group to which it obviously belongs, there is perhaps none in which a greater number of such characters are presented at one view than in the lower surface of the skull. Here are seen,—not only the teeth, whose differences of structure always have, and always will be, made considerable use of in assigning characters to zoological divisions, in whatever way our opinions as to the value of the characters derived from these organs may be modified by further researches,—but also the form and development of the zygomatic arch, with the capacity of the temporal fossa, and the mode in which the jaw is articulated; the form and extent of the bony palate, with its pterygoid appendages, the situation of the occipital foramen, and the structure of the condyles to which the atlas articulates, and many other characters of greater or less apparent consequence, may in the under surface of the cranium be all distinguished at a glance.

Accordingly we find that such of our more modern naturalists whose endeavour has been to fix classification upon a truly philosophic basis, instead of resting satisfied with the arbitrary subdivisions formerly in use, have directed their observations particularly to this part, so that the more obvious characters which it affords have been well observed, and turned to very useful account in determining the extent and affinities of groups; but in some cases, where, from the very close alliance existing between the genera, the differences presented in this part are necessarily very minute, their importance in a zoological point of view has not as yet been recognized. As some of the characters of which I propose to avail myself in the

classification of the order Carnivora consist of peculiarities in respect to certain of the foramina at the base of the cranium, I may perhaps be permitted, although the foramina have already been to some extent studied by those who have entered minutely into the details of mammalian osteology, to point out some instances in other orders, where, in the course of such observations as my opportunities have permitted, I have noticed relationships between the peculiarities presented by the foramina and certain natural groups already established by well-marked characters.

For example, when we see that throughout the whole series of Marsupial Mammalia—an order which, notwithstanding the widely different modifications which its forms present, is marked by many striking peculiarities of structure which quite isolate it from all other members of the class—a number of minor peculiarities are equally constant, and therefore in any species equally indicative of that particular type of structure; and among these, that the internal carotid artery does not enter the cranial cavity, as in most mammalia, by a foramen in the tympanic bone, nor—as is the case in many, and might here be well expected, from the small development of the tympanic bone—through a fissure between that bone and the basi-sphenoid, but through a special foramen, which is pierced on the side of the basi-sphenoid bone, and enters the skull in an inward and forward direction,—we are surely justified in attaching some importance to this peculiarity in a zoological point of view, and in considering it just as characteristic of the Marsupial order as the articulation of the head to the atlas by a double condyle is of the Mammalian class itself.

The remarkable differences in general structure presented by the skull throughout the Rodent order, so carefully investigated and judiciously applied to its classification in the researches of my accomplished friend Mr. Waterhouse, render it quite unnecessary to descend to such minute and comparatively unimportant characters as those which the foramina may afford; and from the frequent imperfection of bony development in these usually small and rather lowly organized mammalia, we cannot expect to find the characters presented by the foramina of so strictly definite a nature as those I shall have to point out in animals of higher types of structure; but nevertheless, when due allowance is made for these occasional imperfections of development, we shall yet find, that although the characters of the foramina in this order are not sufficiently decided to be very serviceable to the zoologist, they present a certain general accordance throughout the groups, which in connection with the present subject may perhaps give them some degree of interest.

In this order, the canal, for which I here propose the name of alisphenoid canal, and which serves to protect the continuation of the external carotid artery during a part of its course, seems to be of nearly constant existence, although in many species of the *Hystrioidæ* it coalesces, through non-development of the separating lamina, with the fissure passing through between the walls of the pterygoid fossa into the orbit. The fissure alluded to, for which Mr. Waterhouse

suggested, though I am not aware that he has published, the name of interpterygoid canal, is a characteristic of this family. There is another remarkable canal which exists in I think I may say the greater number of the species in this order, and which I have not as yet noticed in any species of other orders: its posterior opening is near the foramen ovale, sometimes on the outside and sometimes on the inside of the cranium; it extends forwards a short and variable distance, then opens externally, and serves to transmit a nerve to the masticatory muscles: this canal, which is not unfrequently double, I will here, for convenience of reference, designate the external ali-sphenoid canal*.

The Hares present characters differing from the rest of the order, in the absence of the ali-sphenoid canal†, and in having a distinct canalis caroticus excavated in the tympanic bone; the external ali-sphenoid canal usually exists, and is double, but from imperfection of bony development is not always very clearly demonstrable.

The ali-sphenoid canal must be said to be of constant existence in the *Hystricidae* (as defined by Mr. Waterhouse), although, as I before observed, it often coalesces with the interpterygoid, through non-ossification of the lamina which separates them; for its outer wall is always distinct; and even in the Caviine subfamily, where the maxillary bone extends back to meet the temporal, the ali-sphenoid bone always lines the bridge thus formed, so that the canal no less deserves the name which I have ventured to propose for it. The external ali-sphenoid canal also exists in this family; it is not usually demonstrable in the *Caviina*, having apparently coalesced with the true ali-sphenoid; but in a large skull of the *Capybara* contained in the Society's collection it is very distinctly separated. In some of the Hystricine subfamily (*Sphiggurus*, *Erethizon*, *Chatomys*) this canal is double, and in such of them as have the true ali-sphenoid canal coalesced with the interpterygoid, the lower division of the external ali-sphenoid might perhaps be mistaken for it; but the true ali-sphenoid canal always opens anteriorly *within* the lamina which forms the external pterygoid process and the outer boundary of the coalesced foramina spheno-orbitarium and rotundum, while both divisions of the *external* ali-sphenoid canal open on the outside of this lamina; in those species however which have the true ali-sphenoid canal separate, the homology is at once apparent.

Although the arrangement of foramina in the common Rat and

* This canal is alluded to by Cuvier (*Anatomie Comparée*, 2nd edition) in several cases; I will cite one of them:—"Dans le porc-épic commun . . . il y a dans l'aile pterygoïde externe deux canaux, l'un inférieure, s'ouvrant en arrière à la racine de cette aile, un autre supérieure, et s'ouvrant près du temporal. C'est le premier qui paraît être l'analogue du canal vidien." That is, of the canalis ali-sphenoideus, as I shall hereafter show that it is not the homologue of the vidian canal; the second alluded to by Cuvier is the canalis ali-sphenoideus externus.

† Cuvier also observes, "Dans les lièvres . . . le canal vidien (the ali-sphenoid) n'est qu'un trou dans l'aile pterygoïde externe," and his editors add, within brackets, "et que l'on distingue dans l'orbite tout près et en dehors du précédent." The hole alluded to, however, from being situated quite in the depth of the pterygoid fossa, is much more like the interpterygoid canal in the *Hystricidae*.

the common Squirrel appear very different from each other, there is in fact but little to distinguish, so far as these peculiarities are concerned, between the families to which they respectively belong. In the latter animal, and indeed throughout the family, we find the following arrangement: the foramen ovale is a large round hole, within the edge of which open the posterior orifices both of the true ali-sphenoid canal and the canalis ali-sphenoideus externus, and also of a canal which only penetrates the substance of the basi-sphenoid bone, and meets its fellow from the opposite side. The foramina lacerum anterius and posterius are each of small size; I cannot perceive any distinct canalis caroticus. In the Rat the canalis ali-sphenoideus externus does not exist, its place being marked by a rather indistinct groove in the bone; the true ali-sphenoid canal is present, and its posterior opening is some distance anterior to the foramen ovale; the foramen entering the substance of the basi-sphenoid also exists, but is situated some distance behind the foramen ovale; from the posterior corner of the external pterygoid process there is continued a little bridge of bone, which arches completely over the foramen ovale: there is no canalis caroticus, a groove only representing it. But in specimens that I have dissected for the purpose, I have noticed that the *external* carotid artery actually enters the cranium through a canal in the posterior part of the tympanic bone, from which it emerges above, and after passing within the cranium for a short distance, passes out again through the long fissure that separates the anterior side of the tympanic bone both from the ali-sphenoid and the squamous bones; it then passes through the little bridge that crosses the foramen ovale, and then through the ali-sphenoid canal, after which it, as usual, meets with the second branch of the fifth pair of nerves, and accompanies it through the infra-orbital foramen to the upper lip. But the chief differences here pointed out between the Rat and the Squirrel seem only to consist in the extension backwards, in the latter, of the ali-sphenoid canal to the foramen ovale, and the presence or absence of the lamina that encloses the canalis ali-sphenoideus externus. Some genera of Rats (as *Cricetus*, *Cricetomys*, *Hapalotis*, *Hydromys* and others) present in these respects the same characters as the Squirrels, in some of the larger species of which we even see a very slender arch of bone just before the foramen ovale. However, in all those genera of Rats alluded to, the fissure by which the external carotid artery emerges from the cranium is very apparent, and I have not perceived it to exist in any of the *Sciuridae*.

In the Edentate order, which, though so limited in the number of species, is far from being so in the variety of its forms, the foramina present characters which will connect together those forms which other and more important characters show to be nearly allied. In the Armadillos the optic foramen is small and distinct; the foramen rotundum has coalesced with the foramen spheno-orbitarium; the foramen ovale is a distinct, roundish aperture: there is usually a distinct canalis caroticus, but in the *Dasypus sexcinctus* it is only enclosed at the anterior part; and in one specimen that I have seen,

that of one side only is completely enclosed: the foramen lacerum posterius is very small; there is a distinct foramen glenoideum. In the Manis the characters of the foramina are very similar, but there is no canalis caroticus.

In the *Orycteropus Capensis* the small optic foramen is placed back within the lamina enclosing the coalesced foramina spheno-orbitarium and rotundum, so that in a side-view it is concealed: just before the foramen ovale is an opening into the substance of the bone: the foramen lacerum anterius extends all along the anterior and inner side of the bone of the ear; the foramen lacerum posterius is of a roundish oval form; the foramen condyloideum is very large: there is neither a distinct canalis caroticus nor a foramen glenoideum.

The Sloths have some peculiar characters of their own: in them the foramina opticum and spheno-orbitarium are distinct within, but the orbito-sphenoid sends out a little process forming a canal, which serves as the external opening for both of them; the foramen rotundum is quite separate, opening at some distance below: in the *Bradypus tridactylus* it opens just at the point where the vertical lamina of the palatine bone joins the orbito-sphenoid; the foramen ovale is also very close to the junction with the pterygoid. There is a distinct canalis caroticus, but no foramen glenoideum; the foramen condyloideum is large and conspicuous.

It is in the Pachydermatous and Ruminant orders, however, that I am enabled to show the clearest indications of accordance between certain characters of the foramina and the groups into which these orders are divided. In the elaborate and highly-interesting paper read not long since by Professor Owen before the Geological Society, in which he suggested the admirably-chosen names 'Artiodactyla' and 'Perissodactyla' for the two subdivisions of the Ungulate Mammalia, it is much to be regretted that he has in no way alluded to the characters which the under surface of the skull presents; for they show three different types of structure, which, so far as those genera, of which the under surface of the skull is known, would indicate, appear very distinctly separable. Of these, two are included in the order Pachydermata, as usually adopted, while the third is that of the Ruminant. I am not at present prepared to offer any decided opinion as to the suggestion of Professor Owen, that the two orders ought to be united; and indeed that question forms no part of the present disquisition; but in pointing out the characters presented by the cranium in these three distinct types, I cannot but very much regret that I have not been able to meet with skulls of any of the fossil genera that afford the intermediate links by which Professor Owen proposes to unite the orders, in such a condition as to enable me to discriminate the characters of the basal portion of the cranium. Perhaps the absence of such specimens may in some measure account for the omission of any notice of these characters in the paper to which I have alluded.

In looking on the under surface of a Ruminant skull, the observer is at once struck with the great separation between the nidus of the last molar tooth and the walls of the canal of the posterior nares;

while in both the divisions of the Pachydermatous order the connection between the palatine and maxillary bones is continued quite to the posterior termination of the latter. In the Ruminant the canal of the posterior nares is of immense depth in the vertical direction, its walls extremely thin, the true pterygoid bones reduced to thin laminæ lining the posterior part of the canal, and forming the hamular processes; and although in the Camel and Llama, the external and internal processes (of which the former belongs to the sphenoid, while the latter is the true pterygoid bone) being each well-developed at the tip, there is a considerable notch between them, the outer pterygoid entirely wants that lateral expansion which in animals having a pterygoid fossa forms its outer wall.

The occipital bone has usually its basal surface flat, marked with eminences, of which different ones are more or less developed in different genera. In the Sheep there is a salient one on each side, rendering the surface of the bone between them quite concave; while in the Camel, the Ox, and the Deer, it is another pair of tubercles that are most developed, being situated close to the condyles, the articulating surfaces of which approach each other more than in the Hogs*, and in the Deer and Camel are even continued on to the tubercles. The paroccipital processes also in Ruminants take their origin more towards the outside than in the Hogs, and the space between this process and the condyle is much more deeply excavated. Each of the three separate types of Ungulata before-mentioned has likewise its distinct form of articulation for the under jaw. That of the Ruminants is a slight convexity, shelving off into a nearly semi-circular concavity behind, thus admirably adapted for the rotatory grinding motion of the under jaw; this concavity is bounded behind by a ridge, which terminates within in a small process†.

The following characters are afforded by the foramina:—The foramen ovale is large, distinct and exposed, completely enclosed by the ali-sphenoid bone; there is no trace of an ali-sphenoid canal, nor of a distinct canalis caroticus, it being represented merely by a notch in the auditory bulla, having merged into the adjacent fissures. The foramen condyloideum occupies a rather concealed situation, especially in the Deer, where it is quite hidden by the laterally expanding anterior termination of the occipital condyle: the foramen glenoidium (so named in the second edition of the '*Leçons d'Anatomie Comparée*') exists in Ruminants.

The Hogs and allied genera, constituting the artiodactyle division of the Pachydermata, are constructed upon a second type, also marked by characters seen in the under surface of the skull. The palate is flat and solid, its level much below that of the base of the cranium, extending back quite as far as the extent of the molar series, which throughout its length is closely applied to the walls of the posterior nares; therefore the large notch so remarkable in the Ruminant does

* In the Camel they are absolutely in contact below.

† This process, which is placed more outwardly in the equine type of Pachydermata, is in the Rhinoceros much elongated, and even touches the paroccipital, enclosing the meatus auditorius between them.

not exist, and the pterygoid fossa is nearly in a line with the molar series. The occipital bone presents characters strikingly different from that of the Ruminant; its surface is flat beneath, with a ridge along the middle; the condyles are rather distant from each other, their articulating surfaces terminating very abruptly in front; the paroccipital processes are straight, much prolonged in the genera *Sus* and *Babirussa*, placed less laterally than in either the Ruminants or the other division of the Pachydermata, and from each is continued inwards a ridge on about the same level with the base of the occipital bone, and on or near its summit the foramen condyloideum is seen. The space is short between the posterior nares and the auditory bullæ, and the origin of the zygomatic process, with its articulating surface, is so much pushed back, that a line drawn across from one to the other would pass right through the bases of the large udder-shaped processes of the tympanic bone; and the pterygoid processes of the sphenoid have so much lateral expansion, that when the true pterygoid bones have sufficient development to form the inner walls, the fossæ are very distinctly marked. For the articulation of the lower jaw there is a transversely elongated surface, concave transversely, slightly convex in the antero-posterior direction, which serves alone as a fulcrum for the movements of the jaw, since the space behind it is rugged and does not present the characters of an articulating surface.

But the group at present under consideration seems clearly to admit of separation into two distinct subdivisions, to the first of which, including the genera *Sus*, *Babirussa* and *Phascolotherium*, the foregoing observations are intended more particularly to apply. Of the second, the Peccary and the Hippopotamus present us living examples, and to it the greater number of the extinct genera of artiodactyle Pachydermata must belong, if the difference which the two subdivisions present in the structure of the molar teeth be found constantly to accompany those of the skull*.

As so few genera of this second subdivision of the artiodactyle Pachydermata have presented their entire cranium for our examination, it will be better to content ourselves with pointing out the characters in which that of the Peccary, a convenient standard for comparison, differs from the genuine Hogs.

In this animal the pterygoid bones and processes are pushed nearer the middle, narrowing the aperture of the posterior nares; and although the adult Peccary shows no fissure between the alveoli of the

* In the very brief notice communicated to the Society last year by Mr. Hodgson, of a diminutive species of Indian Hog, on which he founds the genus "*Porcula*," it is much to be regretted, that while endeavouring to establish the zoological position of the genus between the Hogs and the Peccary, and mentioning, as approximating it to the latter, some very trivial external characters, together with the number of molars, which being six in each series, cannot indicate such an affinity, since the *Babirussa*, a true Hog, has (in the adult state at least) only five, he has omitted to acquaint us with the structure of those molars, which it might have been expected that a naturalist would have made the subject of particular observation, and which would very probably have decided the point of affinity in question.

molar series and the walls of the nasal cavity, yet in a rather young skull of *Dicotyles labiatus*, where the penultimate molar has not quite risen into its place, and the last remains still imbedded in its socket, there is on each side a narrow fissure between the posteriorly projecting nidus and the pterygoid appendages; but this character can scarcely be reckoned among some others which do seem to approximate the Peccary to the Ruminants, since the fissure is great even in the adult Ruminant, and in no adult member of the Pachydermatous order does the termination of the molar series extend back so far as to reach the anterior termination of the pterygoid appendage.

It is in the occipital bone that the Peccary departs most from the character usual in the Hog-tribe, and approaches to that structure which is presented by the Ruminants, and by the other large group of Pachydermata. The origin of the paroccipital processes and the absence of the ridges extending inwards from their bases, together with the position of the foramen condyloideum, approximate the genus to the last-mentioned groups; but the processes themselves, although they are short, approach nearer in form to those of the Hogs. The lateral expansion of the pterygoid processes, although still considerable in *Dicotyles labiatus*, is much reduced in the Tajaçu. The glenoid cavity is not pushed back to the same extent as in the Hogs, and its level is relatively much lower than either in them or in the Ruminants, so that a line drawn through the posterior terminations of the articulating surfaces would pass through the auditory bullæ near their lower surfaces; and the structure of the glenoid cavity itself is quite distinct, somewhat resembling that so characteristic of the order Carnivora. It is an oblong surface, lengthened in a direction slanting from behind forwards and outwards, and is concave in the antero-posterior direction. The Hippopotamus shows itself to be closely allied in the structure of the occipital bone and of the glenoid cavity: the pterygoid bone is not sufficiently developed to form the inner wall of a fossa*.

In both divisions of the artiodactyle Pachydermata the foramen ovale is not completed by the ali-sphenoid behind, but truly merits the name of a "foramen lacerum": there is no trace whatever of the ali-sphenoid canal, nor of the canalis caroticus, nor, in the true Hogs, of the foramen glenoideum; this however exists, but is very small in the Peccary, in which also the position of the foramen condyloideum differs from that of the true Hogs in a degree corresponding to the altered structure of the occipital bone.

The third great type of Ungulated Mammalia (the *Perissodactyla* of Professor Owen) is also marked as distinctly by the conformation of the base of the skull, as by that characteristic structure of the tarsus which enables the palæontologist, on looking only at an astragalus, to recognize "the armed Rhinoceros" as readily as if the animal complete were presented to his view. The skulls of the Horse, the Tapir, and the Rhinoceros, when we look on their under surfaces,

* In an excellent skull of this animal contained in the Society's collection, the lacrymal bone forms within the orbit a considerable osseous bulla, having thin parietes, and apparently destined for the protection of the lacrymal sac.

show at one glance so striking a similarity of plan, that if we can but divest ourselves of prejudged notions, which the great contrast in external form may have imparted, we cannot doubt their close alliance; and the little Hyrax, the only other living genus of this family, when we make allowance for those differences of proportion invariably existing between species organized upon one plan, and differing much in size, will also be found closely to resemble its more gigantic relatives. In this group the bony palate is curtailed in length, its level not much below that of the base of the cranium, and the size of the posterior nasal orifice made up chiefly by its great increase of length in the antero-posterior direction. Here also there is no fissure between the wide-spreading walls of the nasal canal and the nidus of the last molar tooth. The form of the auditory bulla presents a nearer approach to the Ruminant than the Hog, as also does the occipital bone, especially in the form and relative position of its condyles and paroccipital processes; but the under surface of its basal portion is flat, and very convex in the transverse section; the lower jaw articulates on a fulcrum similar to that described in the true Hogs, but posteriorly is a smooth concave surface, which terminates behind in a characteristic salient process. Among the characters of the foramina this division is well-distinguished from either of the others by the presence of the ali-sphenoid canal, which exists in all the living genera, and, as already pointed out, is wanting both in the Ruminants and in the Hog-tribe*.

This canal is also present in the Elephant and Mastodon, an aberrant division of the order, also possessing toes in uneven number, and still further characterized by being the only members of the Ungulate division that have a distinct *canalis caroticus*, and by their wanting the *foramen condyloideum*.

A sufficient number of examples have now I think been adduced, to show, that although the instances may be few in which a group could be isolated by characters drawn from the foramina alone, yet in most cases they will be found to be of some assistance in marking the limits of closely-allied divisions; and even in those cases which I have brought forward, it is far from my intention to advocate that

* Since this paper was communicated to the Society, it has struck me that the similarity of structure (which must have been observed by every naturalist who has given attention to the subject of dentition) existing between the premolars and true molars in the members of the Perissodactyle division, may prove an important addition to the zoological characters of that group. This must of course depend upon the confirmation, by further researches, of the idea, that in most Mammalia a *premolar* represents, in the homologies of its component parts, only the *half* of a *true molar*; but there can be no doubt that in the group alluded to the premolars each represent the *whole* of a true molar, for the resemblance in most cases is very striking. Among all the genera, the extinct *Lophiodon* is that which looks most like an exception: unfortunately, I have never had access to any specimens of this genus; but so far as I can judge of it by the figures published, I should be inclined to the belief that further researches will show, that notwithstanding the apparent dissimilarity, the premolars of the *Lophiodon*, as well as those of the other members of the group, each represent the whole of a true molar; and that in the other divisions of the Ungulata, as well as in most members of the class, the half only of a true molar is typified.

any use need be made of such characters as these, when the groups can be so well established upon characters more obvious and important in their nature.

We frequently find groups which, though very extended as to the number of species they contain, are much more limited in respect to the varieties of structure they present than other groups apparently of equal rank containing a much smaller number of species. Such groups are of course always the most easy to isolate, but the most difficult to subdivide: it is in these that we find the most confusion existing, and the greatest variety of opinion among naturalists as to the manner in which their subdivision should be effected. Excepting in the highest divisions, it is but of late years that naturalists have at all appreciated the distinction between what are usually termed "essential" and "adaptive" characters, of the former of which, as we descend to the lower groups, not only is the existence, but also the importance, much less easily recognized.

The base of the cranium, as I before observed, is, from its having less connexion than most parts of the bony framework with the peculiar wants of the species, by far the most rich in such characters; among those which the foramina may afford, I must here dwell rather particularly on the evidences of affinity afforded by the presence or absence of the ali-sphenoid canal, and also explain my reasons for assigning it a new name. As will appear from the observations I have brought forward, it exists throughout the Rodentia, excepting the aberrant family of Hares; it is wanting in the Marsupials and Edentata; and among the Ungulate division, including the Ruminants and Pachydermata, the Artiodactyle division, including the Ruminants and those Pachyderms which have the toes in even number, is constantly characterized by its absence; while in the Perissodactyla it is as constantly present. In the first edition of the '*Leçons d'Anatomie Comparée*,' the illustrious author only alludes to this canal in a very vague manner; and in the more recently published edition, in which the osteology of the cranium is much more fully elaborated, it is spoken of everywhere as being the vidian canal,—the existence of a vidian canal being denied in those animals which do not happen to possess it. From the time when I commenced the series of observations of which the present is an attempt to sum up the results, I always felt inclined to the belief that the canal in question did not correspond in situation to the vidian canal as known in Human Anatomy, since this canal commences just at the root of the internal pterygoid process, while that pointed out as such in the work alluded to is quite on the outside of the homologue of the outer one. Among the rest, the Monkeys are spoken of as wanting the vidian canal; but on removing from the skull of a small monkey in my collection the whole of the posterior portion, and the temporal bones with auditory bullæ, the posterior apertures of the vidian canals became very apparent, and fine bristles passed readily through them into the orbits; and in other skulls belonging to the Quadrumanous order, provided that those portions of the upper maxillary bone which originally constitute the alveoli of the hinder molars do not rise high enough to

conceal the vidian canals, and that the skull be sufficiently well-cleaned, their anterior openings can usually be seen without difficulty. I have succeeded in tracing it throughout the Carnivora, Ruminantia, Pachydermata* and Edentata; it is always, at least in its posterior portion, wholly or partly enclosed by the true pterygoid bone, which constitutes the inner wall of the pterygoid fossa, so that the term "pterygoid canal," which has been applied to it in Human Anatomy synonymously with that of "vidian," is very correctly applicable. Its anterior opening is always just beneath that of the foramen speno-orbitarium, so that the issuing nerve can communicate readily with the second branch of the fifth pair, soon after its exit through the foramen rotundum. It may be further remarked, that the opening of the true vidian canal is always on the inner side of the foramen rotundum, while that of the ali-sphenoid canal is always on its outside, and usually covers and conceals it. However, I think I have removed all doubt by the dissection of a sheep's head, in which I have traced the vidian nerve from its junction with that of the seventh pair to the foramen in question; the course of the nerve is usually longer and more tortuous in the lower animals than in Man.

I have also perceived in some skulls belonging to the Marsupial order, a canal which from its situation seems to be the vidian; in the Rodent order, a distinct vidian canal seems rendered needless by the constant existence of a fissure communicating between the posterior nares and the apex of the orbit, and in some skulls I can even see faint indications of a groove extending from the foramen lacerum anterius round the inner side of the base of the pterygoid bone to the margin of the fissure; but I would not at present venture to deny the existence of a vidian canal in any species, considering that, with the exception of some Edentata, as the Armadilloes, in which its calibre is proportionally very large, it is extremely difficult to perceive in any small-sized animal.

It now becomes my task to place in an intelligible light, the observations on the crania of the Carnivora, which have led me to believe that the classification of this order may be set upon a firmer basis than that afforded by the characters generally made use of. In the course of the present disquisition, I must be allowed to consider this order exclusively of the Insectivora and Marsupials, which are by many naturalists included, the former indeed most usually, as part of the order in question. When the order Carnivora is thus circumscribed, we find it to consist of a very great number of species, being exceeded in that respect among the Mammalian class only by the Rodentia; and notwithstanding the striking difference of ex-

* In the justly celebrated work by Mr. Swan, on the Comparative Anatomy of the Nervous System, it is said that the Common Hog does not possess a distinct vidian nerve running in a bony canal; and certainly, I have not very clearly succeeded in demonstrating the canal in that species, but a skull in my collection of the *Sus Indicus* shows it very well; in the Babirussa, the anterior and posterior portions of the canal each open into the sphenoidal sinus, which has great extent in that animal.

ternal appearance that may be noticed among its members, so that we should anticipate but little difficulty in subdividing the order into a number of natural groups, the confusion, and differences of opinion that have existed, not only as to the manner in which the order should be divided, but also as to the position which certain forms should occupy, show sufficiently that the task is by no means an easy one; and when the structure of the different members of the order is investigated, and those forms are known to us by which the most strikingly different genera are blended one into another, it becomes difficult to draw the lines of separation, and still more to fix the characters by which the groups can with accuracy be distinguished from each other. In the present state of zoological science, it seems scarcely worth while to allude to the distinction of plantigrade and digitigrade, which though due to no less an authority than Cuvier, can hardly be said to possess any claims to the title of a philosophic distinction. Indeed the former of these divisions, if the character be fully insisted on, will include a very incongruous assemblage of forms.

It is upon the differences of the teeth that the subdivision of this order has been made chiefly to depend; but, although it does so happen that in most cases the affinities of a species may be truly predicated by the inspection of these organs, there are some in which naturalists have been led into error by too rigidly depending on them; it must be recollected that, especially in an order like this, where we find among the different species, every gradation between a purely carnivorous diet, and the capability of subsisting entirely on vegetables, the teeth, by the various degrees to which the different cusps are developed, and also by the point at which the normal development of true molars from behind may be arrested, present a very great variety in the amount of tubercular surfaces, or of trenchant edges, to suit the regimen of the species, without any necessary connection with its true affinities. For instance, the remarkable variation in the number of true molars presented by the different genera of the Dog-tribe is known to naturalists; and my own collection possesses the skull of a small dog in which, such is the arrest of development resulting from the shortening of the jaws, that although the individual was very old, it had never developed more than one true molar above and two below, or one behind the carnassial tooth in each jaw, being one less than is usual in the species.

If we except the aberrant family of Seals, we find that this order does not present so many of those very striking extremes of adaptive modification as are to be met with in some others, the generally lithe and active form prevailing through the order rendering a very moderate amount of adaptive modification necessary to fit the animal for almost any situation and mode of life, and from this cause it also happens that since the fallacious nature of the old division into plantigrade and digitigrade has been generally perceived, the classifications of this order most usually adopted by naturalists have approached much nearer to those natural divisions, which the essential

characters point out, than in many other orders; but at the same time, the general similarity of structure, to which I have before alluded, pervading the different modifications of form, has rendered it more than usually difficult to find characters truly essential, and independent of adaptive differences, on which to found truly natural subdivisions. These characters, when found in such an order as the Carnivora, we may fairly presuppose to be minute, and such of them as I have been able to discover, and which I have found to be constant so far as my opportunities of observation have extended, it is my object here to point out; with regard to the foramina, there is one which seems to be very characteristic of the order itself, since even in the true Bears, in which it does not exist as a canal, it is represented by a very well-marked groove. In other Carnivora it consists of a canal situated on the inner surface of the exoccipital bone usually running from before backwards and downwards; it gives passage to a vein; and if a special name should at any time be deemed requisite, perhaps that of exoccipital canal may be found suitable. The characters of which I purpose to make more or less use in the subdivision of the order, are the structure of the pterygoid bones and processes, the presence or absence of the ali-sphenoid canal, the form of the auditory bulla, and the course of the internal carotid artery through its canal, the structure of the mastoid and paroccipital processes, the situation of the foramen condyloideum, and to some extent, the structure of the lower jaw. It is by the fortunate circumstance of possessing in my own collection, crania representing all the leading divisions of the order, that I have been enabled, in the first instance, to remark the differences presented by the characters alluded to; but excepting a few genera, which I have been enabled to examine in the museums of the College of Surgeons and of this Society, it is only in the excellent series of skulls contained in our National Museum that I have been able to collect evidences of their constancy. Such being the limits of my opportunities of observation, it cannot be expected that I should give an opinion as to the precise zoological station of every one of the numerous genera; I will therefore take as a standard system the classification made use of in the List of Mammalia published by Mr. Gray, by order of the Trustees, since in the principal divisions it accords pretty nearly with my own ideas; simply pointing out where I find any genus whose cranium I have examined which I think requires to be altered in its position, and at the same time assigning to the divisions characters of my own, and expressing my opinion as to their rank.

Although in that classification the Bears are placed near the termination of the series, yet I believe it to be most usual to reverse the order and to begin with them; therefore I will first point out the characters which they present, and in so doing will confine myself to the genus *Ursus*, the subfamily *Ursina* of Mr. Gray. We here find no trace of a pterygoid fossa, the outer pterygoid process being closely pressed against the inner one, or true pterygoid bone, and sending off a strong lamina of bone to enclose the ali-sphenoid

canal, and, almost from its apex; a strong column of bone which runs backwards extending behind the foramen ovale, which it quite converts into a canal.

The auditory bulla, although, from the rough flat surface which it presents, it scarcely merits that name, yet may be perceived to show the same essential character as in the Weasels, which is, that it rises suddenly on the inner side at once to its greatest prominence, and is then flattened off towards the meatus, which is rather prolonged. The course of the internal carotid artery, as indicated by the canal excavated for it in the bone, is as follows:—it enters by a true canalis caroticus excavated in the bone of the ear, commencing quite behind, in the same fissure in which open the foramen jugulare and the aperture through which the nervus vagus issues from the skull, and extending forwards in a slightly arched direction again emerges anteriorly, and curving round, enters the cranium in a backward direction through a round foramen between the sphenoid bone and that of the ear, close to the aperture from which the Eustachian tube would issue, and corresponding to the foramen lacerum anterius; there is a distinct foramen glenoideum, although opening rather more inwardly than usual; the mastoid and paroccipital processes are both largely developed, and, owing to the very slight projection of the auditory bulla, stand out very distinct and prominent; the foramen condyloideum anterius occupies an exposed situation; the foramen condyloideum posterius I have never seen in any skull but the human, and there it is said to be sometimes wanting. The characters presented by the lower jaw in the Bears are essentially those most usual, though not quite constant, among the Weasel group; the angular process is pushed up very near to the condyle, and much flattened beneath; the form of the coronoid process is somewhat that of the true Weasels, but owing to the jaws being in the Bear more pushed forwards relatively to the situation of the cranial cavity than in the Weasels, this process is more pushed backward to meet the temporal muscle, which is spread over the sides of the cranium. With regard to the little process projecting beneath and anterior to the angle of the jaw, it is a mere superaddition, which appears again in the *Cercoleptes caudivolvulus* among the subursine group, and also in the *Otocyon Lalandii* and the *Nyctereutes procyonoides* among the Dogs, in these having the form of a large vertical lamina, projecting from the lower surface of the jaw; it is also seen like a second angular process in the Seal, so that I should not feel inclined to assign to it more than a generic value.

The small group of plantigrade Carnivora known to naturalists as the "Subursine group," I will reserve for consideration by and by, and proceed to characterize the Weasel group, the subfamily *Mustelina* of Mr. Gray.

In this group the pterygoid appendages very seldom manifest any tendency to form a fossa, although in many species the outer surface is rough and marked with ridges for muscular attachment; from behind is continued most usually a ridge which runs backwards and

outwards along the lower and posterior margin of the foramen ovale. This group is constantly marked by the entire absence of the ali-sphenoid canal. In the remaining characters this group presents no essential difference from the Bears; the commencement of the canalis caroticus is usually near the middle of the inner side of the auditory bullæ, and anteriorly the vessel does not again quite reach the outside of the cranium, simply showing itself at the point where it doubles, through the cartilage covering the foramen lacerum anterius. The characteristic form of the auditory bulla has been alluded to, and may be traced through the different modifications which it presents; these mostly depend simply on the size of the species, it being much more swollen in the smaller ones, and in the small species of true Weasel much elongated: the mastoid and paroccipital processes also are developed in relation to the dimensions of the species, or even the age of the individual; in the smallest species they have scarcely any projection, while in the larger ones they show the same essential structure as in the Bears, and different from that to be described in other groups. The peculiarities usually exhibited in this group by the lower jaw deserve some mention, even though not sufficiently constant to characterize the group, because some similar characters are seen in certain genera of the Viverrine section, which also show some approach to the Weasels in the characters of the base of the cranium, and therefore seem to be entitled in their own group to the place nearest the adjoining one. The characters in question are, that the coronoid process is rather more upright, and has less curvature than usual in the order, and the angular process is placed closer to the condyle, and is flattened beneath. The straightness of the lower margin of the jaw, alluded to by Mr. Waterhouse in a short communication published a few years ago in the Proceedings of the Society, I will consider by and by.

In the *Viverrine* group there is always a distinct indication of a true pterygoid fossa; the ridge by which it is bounded externally is, in the true Civets, cut off suddenly behind: in the *Paradoxuri* and allied genera it extends further, being blended with the walls of the ali-sphenoid canal, and in some species terminating laterally in a minute process. In the *Herpestine* genera, which are those most approaching to the Weasels, the true pterygoid bones are more extended backwards (which is most usually the case in that group, and also in the Bears), and the outer margin of the fossa is very suddenly cut off, as in the true Civets. With very few exceptions, the ali-sphenoid canal is present in this group: in the second edition of the '*Leçons d'Anatomie Comparée*,' the *Genets* are spoken of as wanting it; it exists however in the skulls that I have seen; the only exceptions that I have as yet met with are in the skulls of the *Rasse* (*Viverra malaccensis*) and of the small species of *Galictis*, recently described by Mr. Gray. In all the other characters, however, these crania indicate clearly the natural affinities. Had these exceptions been of the opposite kind, that is, had the ali-sphenoid canal been present in some species of a group in which it is usually absent, they might have been serious obstacles to the use of this character; but

since they seem to be merely instances of non-development of the bony lamina which should enclose the canal, I think we need not deprive ourselves of the assistance the character affords in the discrimination of groups; and further, I believe it will be found that by taking the aggregate of the characters I am here attempting to describe, the true affinities of any member of the order may without much difficulty be ascertained. The foramen glenoideum, when existing in this family, is of very small dimensions; the auditory bulla has very distinctly the appearance of being divided into two portions, of which the posterior is much the larger, and elongated in form: the more anterior division, which encloses the meatus auditorius externus, is much smaller, and partly overlapped by the other. In *Herpestes* and the genera allied to it the separation is rather less distinct, and the general form of the bulla partakes a little of that of the Weasels. The canalis caroticus is most frequently represented simply by a groove in the inner side of the auditory bulla, to give protection to the artery before it enters the cranium by the foramen lacerum anterius; but in most of the Herpestine genera it is protected by a closed canal, as in the Weasels. These genera, however, have a slight peculiarity of their own in respect to the entrance of the internal carotid artery, and that is, that after emerging from its canal it runs exposed for a short distance before finally entering the cranium. One of the most striking of the essential characters in this family is the structure of the paroccipital process; it is spread out, widened, and closely applied to the posterior surface of the auditory bulla, and the foramen condyloideum is by this means more or less concealed within the aperture of the foramen jugulare: these characters are very distinct in the Civets and Paradoxuri; in the Herpestine genera they are manifested a little less in degree, and the mastoid process is a little more extended, also spread over the auditory bulla, and blended with the paroccipital, so that the bony plate clothing, as it were, the posterior part of the bulla, has the appearance of being pushed a little towards the side.

The characters of the lower jaw, I before remarked, although not sufficiently constant in all cases to separate the groups, sometimes show interesting marks of affinity. In most of the genera of this group the coronoid process curves gently backwards as it rises, which is also its character in the Dogs, the Cats, the subursine group, and even in a few of the Weasels; but in the *Herpestes*, of whose approximation to the Weasels I have already mentioned so many indications, it presents that form of the coronoid process which characterizes most of the members of that group; and the angular process, although it is a salient process, as usual among the Civets, instead of being pushed up towards the condyle, yet shows that flatness on its lower margin which is more distinctly manifested in the Weasels and Bears than in any other sections of the order. The lower outline of the jaw has considerable curvature, both in *Viverra* and *Herpestes*.

Being of opinion that of the two remaining groups, the *Cats* approach the more nearly to the Civets, I will point out their characters

next. In them we still see more or less clearly the indication of a pterygoid fossa, but there is never any trace whatever of the ali-sphenoid canal, nor of the foramen glenoideum. The auditory bulla is always full and round, even in the largest species, in which however, as may be expected, it is proportionally less in size: in some species slight traces may still be discerned of the separation noticed in the *Viverra*; the canalis caroticus is very minute: in this group the internal carotid artery itself is very small; the canal commences towards the posterior part of the auditory bulla, and never again appears at the outside, the foramen lacerum anterius being quite wanting. The characters of the paroccipital process are precisely those of *Viverra*, but its extent is much less, and the mastoid is rather more developed; the foramen condyloideum is concealed, just as in the Civets.

In a brief communication published by Mr. Gray in the 'Annals and Magazine of Natural History,' in which he describes a new genus of Dogs under the name *Cynalicus*, he very justly remarks, "the tubercular grinders are very variable in this tribe." I will now endeavour to point out some characters that can rather more safely be depended on. The pterygoid appendages have usually a deeper projection than in most other members of the order, and though marked with ridges on the outer side, these are scarcely sufficiently extended to form a fossa: the ali-sphenoid canal is a constant characteristic of the tribe; to this I have seen no exceptions, and should consider such a non-development as we have seen occasionally to occur in some of the smaller and more delicately constructed Civets less likely to happen among the Dog-tribe. The foramen glenoideum is always present and of large size. The auditory bulla is rather similar to that of the Cats, but usually a little flatter and not divided, and, like that of the Cats, is a little excavated towards the hinder and inner part, to form a considerable foramen lacerum posterius, in which open not only the foramina for the jugular vein and the nervus vagus, but the commencement of the canalis caroticus, which is of considerable size, and takes a course precisely similar to that of the Bear. The mastoid process is but moderately developed, but the paroccipital is very characteristic; its anterior edge is applied to the auditory bulla, but instead of being at all spread out, the process is laterally compressed and very salient, both in the vertical and backward direction. The foramen condyloideum occupies a very exposed situation, being upon the middle of a flat ridge which extends between the basi-occipital and the paroccipital process.

With the addition of the *Phocidæ* or Seal-tribe, the divisions which I have here attempted to characterize will correspond exactly to the six families proposed by Mr. Waterhouse in the paper before alluded to. It may however be very fairly questioned, whether a group whose members are so closely connected among themselves, and differ so little in essential characters, will justly admit of being divided into six sections, of so high a rank as the term 'family' is usually understood to imply. Mr. Gray, on the other hand, makes use of only two families, the *Felidæ* and the *Ursidæ*, including among the latter,

besides the true Bears, only the genera *Procyon*, *Nasua*, *Cercoleptes*, and *Ailurus*. I must confess that I cannot concur with him in including the subfamily *Mustelina* among the feline family, and at the same time separating the Bears from them as a separate family; for the course of my observations has convinced me that the Weasels are decidedly more closely allied to the Bears than to any other members of the order. Numerous genera have at various times been one after another abstracted from the Bear-tribe, and added to that of the Weasels, until at length only the four that I have mentioned have remained associated with the Bears. Some remarks in Mr. Waterhouse's paper seem to imply considerable affinity between the Weasels and the Cats. He observes, "The Cats appear to bear the same relation to the *Mustelidæ* as the Dogs to the *Viverridæ*." This may be, but I should not consider that relation a very close one. He alludes particularly to the straightness of the lower jaw as a common character of the two groups: in the first place, I would remark, that this character is by no means constant among the Weasels; and secondly, that it is merely a circumstance of form, resulting from other adaptive modifications of the form of the entire cranium, such as the relative length of the jaws, and the development, both in size and number, of the molar teeth. As the posterior termination of the molar series is always on a rather lower level than the glenoid cavity, and as the line of the dental series inclines regularly upwards and forwards, it follows, that for the incisors of the lower jaw to close with those of the upper, the lower jaw must be curved in proportion as the jaws are lengthened.

Among the characters which I have pointed out in the base of the cranium, it will be seen that the only tangible distinction between the Bears and the Weasels is the presence of the ali-sphenoid canal in the former, and its constant absence in the latter. Much as I have insisted upon the importance of this character as assisting to distinguish groups, I do not consider it sufficient alone to entitle the groups which it separates to the rank of *families*; neither am I prepared to admit the difference of the teeth sufficient for that purpose, these being, as I before observed, merely adaptive modifications. In the true Bears the number of true molars is on each side *two* above, and *three*, the full normal number, below. In the Weasels it is only *one* above and *two* below. In the subursine group, to which I must add the *Bassaris astuta* of North America, it is *two* above and *two* below; and among these it is only the *Ailurus fulgens*, an Indian species, which possesses the ali-sphenoid canal; while the other four genera, namely *Procyon*, *Nasua*, *Cercoleptes*, and *Bassaris*, all American forms, agree among themselves in possessing the general characters common to the Bears and the Weasels, and in having no ali-sphenoid canal, and two true molars on each side in each jaw. The *Bassaris astuta* has most usually been placed among the Viverrine section, in which it also appears in the list published by Mr. Gray; but doubts have at various times been entertained as to that being its true station. Mr. Waterhouse remarks, in a note appended to the paper from which I have before quoted, "From an examination

of the external characters of *Bassaris astuta*, it appears to me that it belongs to this (the subursine) group ;” and Mr. Blyth, in the translation of Cuvier’s Animal Kingdom, mentions the *Bassaris* immediately after the *Cercoleptes*, and in a note very justly observes, “ Strong presumptive evidence that the Basset (*Bassaris*) does not appertain to the Viverrine group is afforded by the restriction of the geographic range of the latter to the eastern hemisphere in every other instance. The presence or absence of a cæcum would decide the question.” I am not aware whether this last-mentioned point has ever been ascertained, but from the characters presented by the cranium, I do not feel the slightest hesitation in referring this animal to the subursine group. It is true that the teeth have some resemblance to those of the *Viverræ*, but this only results from the greater or less development of different cusps, being an adaptation to a more carnivorous diet. The bony palate terminates more anteriorly than is usual in the Weasels, but this circumstance only depends upon the greater or less extension of a bony lamina, and I think is of but little moment : the pterygoid appendages are rather feebly developed.

If then we constitute the Bears and Weasels one family, *Ursidæ*, which I think the essential characters, however small they may appear, will readily warrant us in doing, we can then avail ourselves of the ali-sphenoid canal and the adaptive modifications of dentition to subdivide it into four subfamilies, namely *Ursina*, including only the true Bears, and characterized by the presence of the ali-sphenoid canal, and of two true molars on each side above and three below ; the very remarkable genus *Ailurus*, of India, will of itself constitute a second subfamily *Ailurina*, having also the ali-sphenoid canal, but only two true molars below. In the third subfamily, *Procyonina*, I would include *Procyon*, *Nasua*, *Cercoleptes*, and *Bassaris*, an entirely American group, distinguished by the absence of the ali-sphenoid canal and the same number of true molars as *Ailurus* ; and lastly, the extensive group of *Mustelina*, characterized also by the absence of the ali-sphenoid canal, and having only one true molar on each side above and two below.

Of the remaining groups, I have already expressed my opinion that the Cats and the Civets are the most nearly allied to each other. Among the characters which I have assigned to them will be found differences by which they may be distinguished from each other ; but in the most remarkable and the greatest number of characters they differ chiefly in degree. To each of these has been referred in turn the group of Hyænas, usually considered as allied to the Cats ; but Mr. Waterhouse urges that the *Viverræ* have the stronger claim to this aberrant genus. From the characters of the cranium, I should consider it as rather more approaching to the Cats. In all skulls of the Hyæna that I have seen, the ali-sphenoid canal is wanting, although in the second edition of Cuvier’s ‘ Leçons d’Anatomie Comparée ’ it is affirmed that this canal (there called the vidian canal) is present, and that the author possessed a skull in which it existed on one side but not on the other. The roundness and want of division of the auditory bulla and the minuteness of the canalis caroticus approximate the Hyæna

to the Cats; in all the characters common to the Cats and Civets the Hyænas also agree. However, if these three groups be united, as I think would be justified by the characters, the difficulty in a great measure will be overcome. Three subfamilies will then constitute the family *Felidæ*; the *Felina* are characterized by the absence of the ali-sphenoid canal, the very minute size of the canalis caroticus, the absence of the foramen glenoideum, the auditory bulla having but little or no trace of division, and the molar series consisting of only three premolars and one true molar on each side above, and two premolars, with one true molar, below. The next subfamily, *Hyænina*, presents, as I have just before pointed out, the same cranial characters as the Cats, but it differs, as is well known, in the dentition. The largest subfamily of the *Felidæ*, the *Viverrina*, possess in general the ali-sphenoid canal, and sometimes a minute foramen glenoideum; the auditory bulla is more or less distinctly divided into two portions; the canalis caroticus is of average dimensions, although not always completely enclosed, and is placed towards the anterior part of the bulla, and the artery, after having passed through the canal, shows itself externally before finally entering the cranium: the dentition is on each side usually four premolars and two true molars, both above and below. The very singular genus *Proteles* has the cranial characters common to the Cats and Hyænas: from the dentition, so singularly modified by arrest of development, but little evidence of zoological affinity can be adduced; I should therefore be rather inclined to consider it a modified Hyæna, since in the external characters it so closely resembles the animals of that genus.

The Dogs, or the subfamily *Canina* of Mr. Gray, remain, and I think must constitute a separate family *Canidæ*; they all agree precisely in those cranial characters which I have pointed out, and notwithstanding the variation in the number of the true molars, do not seem to admit of division into subfamilies. It is rather remarkable that in the different genera of this family we find precisely the same variation in the number of the true molars as in the subfamilies of the *Ursidæ*; as, setting aside the genus *Otocyon*, in which they are developed, we may almost say, beyond their normal number, there are *two* above and *three* below in the genera *Canis*, *Vulpes*, *Nyctereutes*, and *Lycaon*, as in the *Ursina*, *two* above and *two* below in the genus *Cyon*, as in the subfamilies *Ailurina* and *Procyonina*, and only *one* above and *two* below in *Cynalicus*, which is the number found in the Musteline group. This being the case, on first looking at the imperfect skull of the *Cynalicus* in the British Museum, which unfortunately exhibits only the anterior portion, I was led for a moment to suspect that the true place of this remarkable genus might be among the Weasels, and was the more led to this idea from the circumstance that the animal, in proportions and in colouring, bears a remarkable resemblance to the *Galera barbara*, also an inhabitant of South America; but on more attentive examination I perceived, that not only did the last molar resemble precisely the penultimate in the Dog, but sufficient remained of the skull to show, in the form of the pterygoid appendage, and the presence of the ali-sphenoid canal,

characters decisive against the musteline, and in favour of the canine group. And subsequently Mr. Waterhouse kindly pointed out to me, in that department of the Museum which is entrusted to his care, a fossil cranium from Brazil, which, from being found associated with jaws evidently belonging to that species, is most probably referable to the same, and in this I found that all the characters of the base of the cranium were precisely those of the Dogs.

Although I have not had sufficient opportunities to enable me to offer anything original on the other parts of the anatomy of the Carnivora as bearing upon their classification, perhaps I may be allowed to mention a few known circumstances, which, as they co-exist (so far as is yet known) with the characters which I have pointed out in the three families *Ursidæ*, *Felidæ*, and *Canidæ*, may serve to indicate that the importance I have assigned to those characters is not altogether undeserved. The presence or absence, and the structure of the cæcum have frequently been made use of in determining the limits of groups; and I need but to remind my readers, that in the Weasels, as well as in the Bears and the subursine animals, the cæcum is wanting, and there is little or no distinction between small and large intestine; also that it is in the Cats, in the Hyæna, and the Viverrine section, that this separation is well-marked, and a small or but moderate-sized cæcum is appended. In the Dog, the large intestine is but very little larger than the small intestine, but the separation is marked by a constriction, and by the addition of a cæcum remarkable for the curious manner in which it is several times folded upon itself. There are two other portions of the organization to which I will also allude, as affording characters serving to distinguish the three leading families; and in so doing I take the facts as I find them in the 'Leçons d'Anatomie Comparée,' stated simply, and evidently without any intention of assigning to them any zoological importance. First, with regard to the accessory glands connected with the generative organs of the male: the vesiculæ seminales are wanting throughout the order, unless it be in the Coati-mondi, which Cuvier mentions among the animals possessing them: this solitary exception, if so it be, seems to require confirmation; unfortunately the only two Coati-mondis it ever fell to my lot to examine were both young females. The prostate is spoken of as forming in the Bear, and in the Otter, the Weasel and other "vermiformes," only a layer more or less thick around the commencement of the urethra, while in the Ichneumon, the Cats, the Dogs, the Hyæna, and the Civets, it is salient, differing however in size and the number of its lobes; and Cowper's glands are wanting in the Bear, the Raccoon, the Otter, and other "vermiformes," and also in the Dogs, but exist in the Ichneumon, the Civet, the Hyæna, and in the Cats.

The larynx is an organ whose differences of structure are very likely to afford useful zoological characters when studied with that view. Cuvier, after describing the structure it presents in the Dogs, where the most striking characters seem to be the considerable development of the cuneiform cartilages, their S-like shape, and

their continuity with the borders of the epiglottis, proceeds to point out the differences presented by that of the Cats, and briefly observes, "Le Mangouste et la Civette ont la glotte comme les Chats." He then describes a third variety of structure presented by the Bears, and mentions differences in the Racoon, the Badger, the Marten, the Otter, and the Coati, consisting merely of variations presented by the chordæ vocales, and in some the superaddition of sinuses, doubtless only adaptive modifications to the different kinds of voice.

In the foregoing observations nothing has been remarked with reference to the Seals, nor indeed is it absolutely necessary; for the limits of a group, so distinctly marked and peculiarly modified, are never at all likely to be mistaken; but as this singular family is truly and essentially a portion of the order whose arrangement it is here my endeavour to elucidate, a few observations upon them may seem a little called for. Naturalists have long been accustomed to separate from the rest those which are distinguished externally by the presence of the small external ear, and the long riband-like processes of skin projecting from the toes of the hind-feet. These genera, *Otaria* and *Arctocephalus*, are also in their cranial characters the most distinctly separable from the rest, through which, with the exception of the Walrus, a great uniformity prevails, so that a mention of the characters in which the common Seal differs from those having external ears may perhaps suffice. Here there is no trace of a postorbital process, nor of an ali-sphenoid canal; the mastoid can scarcely be said to constitute a process; it is swollen, and appears to form a portion of the auditory bulla, more or less connected with the tympanic portion, from which it is separated by a depressed groove running from the stylo-mastoid foramen backwards and a little inwards. The paroccipital process is never large in any of the family, but it is always distinctly developed, and salient backwards. The *Arctocephalina* group are distinguished at once by their having a distinct postorbital process and an ali-sphenoid canal; the mastoid projects as a strong process, and seems, as it were, to stand aloof from the auditory bulla, which is small and rounded. The carotid canal has precisely the same course as that pointed out in the Bears and Dogs, while in the common Seal it enters rather more forward, and does not show itself again externally. The *Arctocephalina* have the orbito-sphenoids much compressed together anteriorly to the optic foramina, which almost appear to have coalesced into one: they are also remarkable for the strong development of a process on the anterior part of the rim of the orbit; this however will not well serve as a character, since it is apparent, though in a much less degree, in some of the larger species of the ordinary type, as the *Stenorynchus leptonyx*. The Walrus is a peculiar form which I should deem it advisable to constitute a distinct subfamily, since I cannot concur with Mr. Gray in associating with it the *Halichærus gryphus*, whose skull presents all the characters of the true Seals, the elevation in the nasal portion having no relation whatever with the immensely swollen upper jaw of the Walrus, which is necessitated by the enormous size of the canine teeth: in this animal there is no postorbital

process, but that on the anterior rim of the orbit is very strongly developed; there is also an ali-sphenoid canal whose outer wall is very thick; the mastoid is a large thick process, projecting very much as in *Arctocephalus*, but its surface is for the most part continuous with that of the flattened auditory bulla.

If we adopt all the five subfamilies into which this family is divided in the list published by Mr. Gray, the Walrus, and the Arctocephaline group, which differ so decidedly from the other Seals, would almost seem entitled to the rank of families; but rather than so completely dismember such a well-marked group as that of the Seals, I should feel disposed to assign to the differences of the teeth no more than a generic value, and to restrict the number of subfamilies to three,—the *Phocina*, *Trichecina*, and *Arctocephalina*, including in the latter the genera *Otaria* and *Arctocephalus*, the Walrus alone constituting the *Trichecina*, and all the other Seals falling under the first-named section.

I cannot conclude without offering some apology for the length of my communication, more particularly as the number of minute details of form alluded to may render it a little tedious, and among the facts enumerated the number is so small that possess any claim to be considered new; but if I have to any extent succeeded in placing in a clearer light the mutual affinities of the different genera of Carnivora, a subject of which I think all will admit the difficulty, or if I have but brought into its due importance any character, however small, which may render the determination of a fragment more easy to the palæontologist,—if I have achieved but a very small share in the important task of elucidating those real affinities existing throughout nature, which must, when completely made out, render classification not a mere alphabet of reference for the determination of species, but a key to higher generalizations, I trust that my labours have not been thrown away, and that my apparent prolixity may be overlooked.

In offering the annexed synopsis with a view to render the arrangement I would propose more readily comprehensible, I must observe, first, that the lists of genera include only those whose crania I have examined, and therefore I must not be considered as rejecting any that I have omitted, nor do I pledge myself to adopt all that are inserted. Secondly, that the difficulty of expressing in a manner sufficiently decided, and at the same time sufficiently brief for a synoptical form, the characters I have made use of, has compelled me to omit some of them. In order to place the Herpestine genera of the Viverrine subfamily in juxtaposition with the Weasel group, it is advisable that the series of terrestrial Carnivora should either commence with the Bears and terminate with the Dogs, or *vice versa*; and as I have not seen in the Seals anything which, in my opinion, warrants their approximation to any of the other families more than to another, it matters little which mode be followed.

Fam. URSIDÆ.

Auditory bulla rising suddenly on its inner side, and more or less flattened off towards the meatus.

Paroccipital process prominent, and neither flattened on the surface of the auditory bulla, nor laterally compressed.

Foramen condyloideum exposed. A considerable foramen glenoideum.

No cæcum. No Cowper's glands.

Prostate gland not salient, being contained in the thickened walls of the urethra.

Subfam. URSINA. (Of general geographical distribution.)

A distinct ali-sphenoid canal.

Internal carotid artery reappearing externally after passing through its canal, and doubling back to enter the cranium.

True molars on each side $\frac{2}{3}$.

Ursus (including the subgenera).

Subfam. AILURINA. (Confined to India.)

A distinct ali-sphenoid canal.

True molars on each side $\frac{2}{2}$.

Ailurus.

Subfam. PROCYONINA. (Confined to America.)

No ali-sphenoid canal.

True molars on each side $\frac{2}{2}$.

Procyon.

Nasua.

Cercoleptes.

Bassaris.

Subfam. MUSTELINA. (Of general geographical distribution.)

No ali-sphenoid canal.

True molars on each side $\frac{1}{2}$.

Arctonyx.

Meles.

Taxidea.

Mydaus.

Mephitis.

Gulo.

Helictis.

Mellivora.

Grisonia.

Galera.

Vison.

Mustela.

Martes.

—

Lutra.

Fam. FELIDÆ.

Auditory bulla rounded, frequently showing indications of being divided into two parts.

Paroccipital process flattened, and applied to the back-part of the auditory bulla.

Foramen condyloideum more or less concealed. Foramen glenoideum very small or wanting.

Cæcum small or moderate, simple. Cowper's glands present. Prostate gland salient.

Subfam. VIVERRINA. (Confined to the old world.)

A distinct ali-sphenoid canal (with very few exceptions*).

Auditory bulla distinctly subdivided.

Canalis caroticus distinct, though sometimes only as a groove.

True molars on each side $\frac{2}{2}$.

Galictis.

Ryzæna.

Cynictis.

Herpestes.

—

Arctictis.

Cynogale.

Paradoxurus.

—

Prionodon.

Genetta.

Viverra.

Subfam. HYÆNINA. (Confined to the old world.)

No ali-sphenoid canal.

Division of auditory bulla scarcely perceptible.

Canalis caroticus indistinct, or very small.

True molars on each side $\frac{1 \text{ or } 0}{1}$; premolars on each side $\frac{4}{3}$.

Proteles.

Hyæna.

Subfam. FELINA. (Of general geographical distribution.)

No ali-sphenoid canal.

Division of auditory bulla slightly, or scarcely perceptible.

Canalis caroticus indistinct, or not perceptible.

True molars on each side $\frac{1}{1}$; premolars on each side $\frac{3}{2}$.

Felis.

Fam. CANIDÆ.

A distinct ali-sphenoid canal. A considerable foramen glenoideum.

Auditory bulla rounded, not divided.

Internal carotid artery reappearing externally after passing through its canal, and doubling back to enter the cranium.

Paroccipital process laterally compressed, foramen condyloideum exposed.

Cæcum folded upon itself. No Cowper's glands. Prostate gland salient.

Cynalicus.

Cyon.

Lycaon.

Canis.

Vulpes.

Nyctereutes.

Otocyon.

* The exceptions that I have seen are the Rasse (*Viverra malaccensis*) and a species of *Galictis*.

Fam. PHOCIDÆ.

Molars all similar in structure. (The general characters need not here be enumerated, being universally known.)

Subfam. ARCTOCEPHALINA.

A postorbital process. An ali-sphenoid canal.

Mastoid process strong and salient, standing aloof from the auditory bulla.

Otaria.

Arctocephalus.

Subfam. TRICHECINA.

No postorbital process. A distinct ali-sphenoid canal.

Mastoid process strong and salient, its surface continuous with the auditory bulla.

Trichecus.

Subfam. PHOCINA.

No postorbital process. No ali-sphenoid canal.

Mastoid process swollen, and seeming to form part of the auditory bulla.

Morunga.

Cystophora.

Halichærus.

Ommatophora.

Lobodon.

Leptonyx.

Stenorhynchus.

Phoca.

June 13, 1848.

Harpur Gamble, Esq., M.D., in the Chair.

The Secretary exhibited the skull of an Antelope closely allied to *A. euryceros*, Ogilby, and read the following extract from a letter which he had received in reference to it from Capt. William Allen, R.N. :—

“I am sorry I cannot give you any satisfactory reminiscences of the Antelope. It was, I should think, about three feet high, or rather more, of a darkish brown colour, but I do not remember any white band across the forehead. The place where I saw it was called Kokki, on a small tributary, the Abo, of the Cameroons river, or Mādibama Dualla, in the Bight of Biafra. It was a pestiferous locality and a foggy morning, so that I was anxious to get away as soon as possible, but left one of my black men to skin it, and he only brought the skull and horns. I have no doubt the forests at the foot of the Cameroons mountain would furnish you with some valuable additions to zoology. I cannot say anything about the sex of the Antelope.”

Proc. Z. S. Mamm. IV.

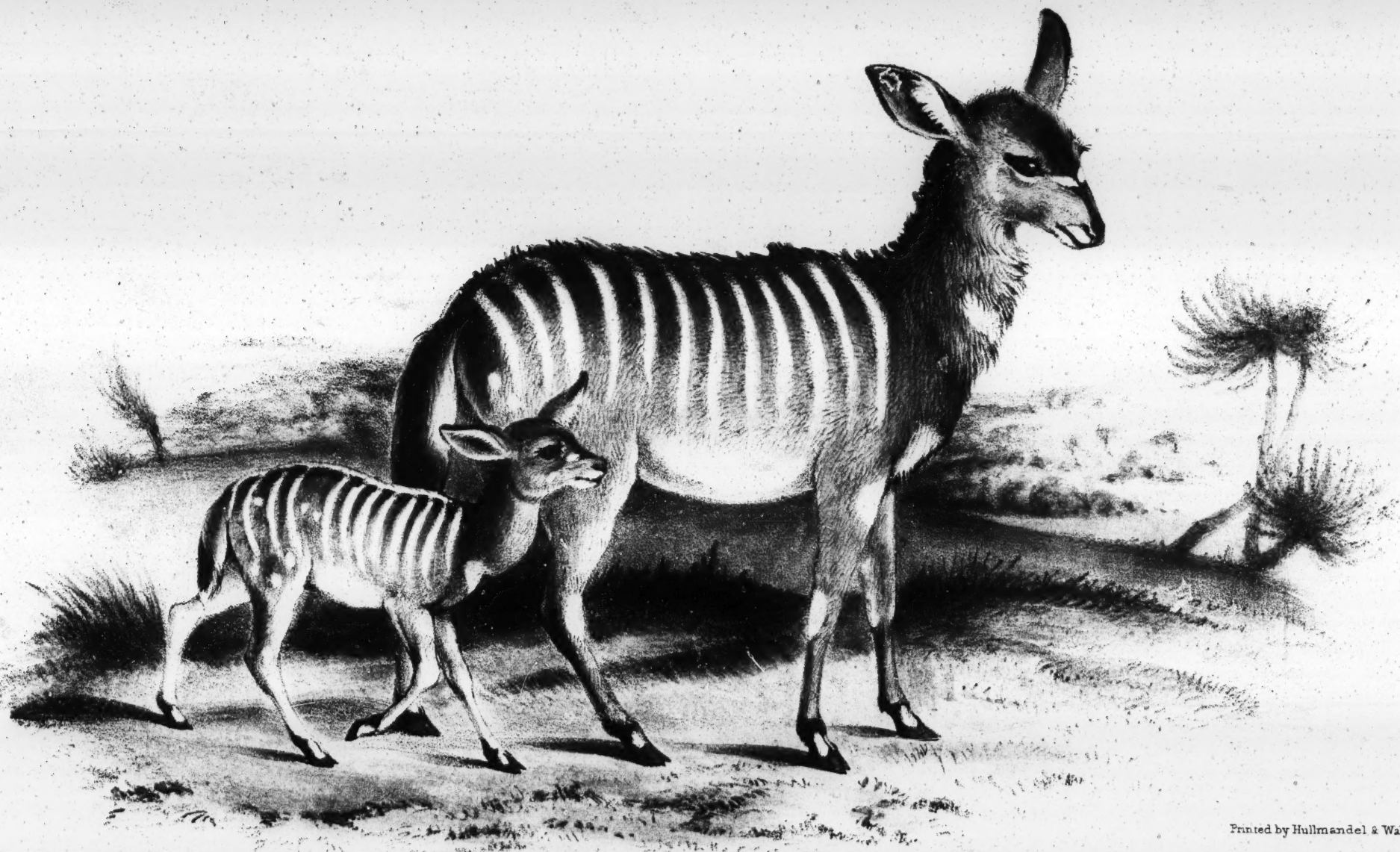


B. W. Hawkins del. from a sketch by G. E. Angas.

TRAGELAPHUS ANGASIL. ♂

Printed by G. W. Anderson & W. H. W. W. W.

Proc. Z. S. Mamm. V.



Printed by Hullmandel & Walton

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The other communications were :—

1. DESCRIPTION OF *TRAGELAPHUS ANGASII*, GRAY, WITH SOME
ACCOUNT OF ITS HABITS. BY GEORGE FRENCH ANGAS.

(Mammalia, pl. 4, 5.)

This new and brilliant Antelope, the *Inyala* of the *Amazulu*, appears to be a link between the Koodoo and Boshbok, uniting in itself the markings and characteristic features of both these animals.

The adult male is about 7 ft. 6 in. in total length, and 3 ft. 4 in. high at the shoulder. Though elegant in form, and with much of the grace of the solitary Koodoo, the robust and shaggy aspect of the male bears considerable resemblance to that of the Goat. Legs clean; hoofs pointed and black, with two oval cream-coloured spots in front of each fetlock, immediately above the hoof. Horns 1 ft. 10 in. long, twisted and sublyrate, very similar to those of the Boshbok, but rather more spiral; have sharp polished extremities, of a pale straw-colour; rest of horns brownish black, deeply ridged from the forehead to about half the length of the horn. Prevailing colour greyish black, tinged with purplish brown and ochre; on the neck, flanks, and cheeks, marked with several white stripes like the Koodoo; forehead brilliant sienna-brown, almost approaching to orange; mane black down the neck, and white from the withers to the insertion of the tail. Ears 8 in. long, oval, rufous, tipped with black and fringed inside with white hairs; a pale ochreous circle round the eyes, which are connected by two white spots forming an arrow-shaped mark on a black ground; nose black; a white spot on each side of the upper lip; chin and gullet white; and three white marks under each eye; neck covered with long shaggy hair, extending also under the belly and fringing the haunches to the knees; two white spots on the flanks, and a patch of long white hair on the anterior portion of the thigh; a white tuft under the belly, and another on the dewlap; on the outer side of the fore-legs is a black patch above the knee surrounded by three white spots; legs below the knee bright rufous colour; tail 1 ft. 8 in. long, black above, with tip and inside white.

Female smaller and without horns; total length 6 ft.; nose to insertion of ear 10 in.; length of ear $6\frac{1}{2}$ in.; height from fore-foot to shoulder 2 ft. 9 in.; tail 1 ft. 3 in. in length. Colour a bright rufous, inclining to orange, becoming very pale on the belly and lower parts, and white inside the thighs; a black dorsal ridge of bristly hair extends from the back of the crown to the tail; nose black; the white spots on various parts of the body nearly resemble those of the male, only the white stripes on both sides are more numerous and clearly defined, amounting to twelve or thirteen in number; tail rufous above and white below, tipped with black.

The young resembles the female, but is rather paler in colour, and has more white spots on the flank and sides.

Inhabits the lower undulating hills scattered with Mimosa bushes, that border upon the northern shores of St. Lucia Bay, in the Zulu

No. CLXXXVI.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

country, lat. 28° south. Found in small troops of eight or ten together, feeding amongst the thickets.

Mr. Gray has named this species after my father, George Fife Angas, Esq., of South Australia, who has always taken a lively interest in my travels and researches in natural history. I may add, that the preceding notes were drawn up from recently-killed specimens, which I in vain attempted to purchase from the Boers who possessed them.

2. DESCRIPTION OF A NEW SPECIES OF *PODICA*.

BY G. R. GRAY, ESQ., F.L.S. ETC.

(Aves, pl. 4.)

The bird now laid before the Meeting forms a second species of the genus *Podica*, Less., the type of which, *P. senegalensis*, is peculiar to Western Africa. It was obtained from Malacca, and thus extends the range of this singular group, *Heliorninae*, to a third quarter of the globe. The only species known until of late years, which is the type of the subfamily (*Heliornis surinamensis*), exists in the warmer parts of the American continent.

PODICA PERSONATA, n. sp.

Sp. ch.—Upper parts olive-brown; top of the head, lores, cheeks and jugulum, deep black; back of neck bluish olive; a short white streak borders the black from the posterior angle of the eye; the lower surface white; breast tinged with brown; the side-feathers faintly, and the under tail-coverts deeply, barred with brown; the quills and tail deep brown; bill yellow; the feet lead-colour, and the membrane that borders the toes yellow.

Total length, 20 inches; bill, 2 inches and 2 lines; wing, 10 inches; tarsi, 1 inch and 10 lines.

It differs from the typical *Podica* in having a portion of the lores naked, in the greater breadth of the tail-feathers, and in their being rather rigid.

The only specimen I have seen, from which this description and the drawing have been made, was presented to the British Museum by the Right Hon. the Earl of Ellenborough.

3. DESCRIPTION OF NEW SPECIES OF THE GENUS *CYPRÆA*.

BY J. S. GASKOIN, ESQ.

1. *CYPRÆA THERSITES* (High-backed Cowrie). *Cyp. testâ ovatâ, gibbosâ, dorso elevato, basi latâ planâque, saturatè rufescente-fuscâ; anticè posticèque depressiusculâ, aperturâ angustatâ, posticè recurvâ; dentibus albis, distinctis, labiî externi validis, columellari minùs prominentibus; sulco columellari anticè profundo, lato; extremitatibus valdè productis, canali antico pleno.*

Shell ovate, very gibbous and high-backed, of a very dark, reddish-brown colour, not uniformly equal in intensity; a curved whitish mark exists over both the anterior and the posterior extremities, at which places there is a depression, as though the mantle had not deposited any substance there after it had begun to secrete the



colouring-matter, particularly that at the last whorl of the spire; aperture narrow, much curved at the posterior third of its length, the other two-thirds nearly straight; teeth white, distinct, even, about twenty-seven on the outer side, extending but slightly over the lip; on the columellar side about twenty-four, broader at the anterior end, while along the continued edge of the aperture to its posterior extremity are mere indications of teeth; columellar sulcus deep and broad, not extending beyond the more prominent teeth; base broad and flat, its entire circumference of an uniform dark, reddish-brown colour, or spots of a similar colour, the colour lessening in intensity towards the middle portion of the base, which is white, as is also the interior of the shell; margins project, especially that of the lip; extremities produced, the posterior forming sharp or thin edges, and extending much upwards; that on the columellar side terminating at the apex of the spire; the anterior extremities also thin, and the channel upright.

I have seen this shell only in the adult state. It has no general characteristic in common with any known species; the extremities however have much similitude to *Cypræa Scottii*; but it is a much shorter, more gibbous, heavier and thicker shell.

Long, $2\frac{7.5}{100}$ inches; high, $1\frac{5.0}{100}$; wide, 2.

Hab. —?

Cabinets of British Museum, Saul, Cuming, &c.

2. *CYPRÆA MARGINATA* (Broad-margined Cowrie). *Cyp. testâ ovata, anticè subacuminatâ, posticè et medianè valdè gibbosâ; colore floris lactis, maculis fulvis, paucis irregulariter sparsis; basi valdè planâ et latâ; marginibus externis medianè fulvo-brunneo punctatis, punctis discretis; aperturâ latâ, subspirali; columellâ posticè gibbosâ, sulco parvo antico; dentibus lateris columellaris circa viginti, latè distinctis; lateris externi aequalibus paululùm extensis, anticè minoribus, circa viginti novem; extremitatibus, posticâ productâ, planâ, canalem latam sursum formante, anticâ minùs productâ, convergente, canalem brevem sursum formante; spirâ valdè conspicuâ; marginibus planis, tenuibus, valdè extensis.*

Shell ovate, anterior end rather pointed, the posterior and middle very gibbous; of a cream-colour, a few fulvous spots are irregularly scattered over the entire back and sides of the shell, apparently the commencement of the deposition of colouring-matter; base flat and very broad, on the outer edges are discrete fulvous brown spots, the rest of the base, the teeth, and the interior of the shell are of a clear cream-colour; aperture wide, spiral; columella gibbous posteriorly, a slight sulcus at the anterior end; teeth form, on the columellar side, a single angular serrated edge, about twenty in number, wide apart and not very prominent; on the other side they are more regular and even, extending, slightly prominent, half across the lip; they are smaller and more perfect towards the anterior extremity, and about twenty-nine in number; the extremities are produced, flat, form a broad channel, passing upwards at the posterior end of the shell, and terminate at the outer side of the apex of the spire; the

anterior extremities are much less produced, and converge, forming a short channel running upwards; spire very prominent; margins flat and thin, extending much outwards; the angle formed by the attachment of the outer margin to the shell is of a light brown colour, from which anteriorly radiate lines of the same colour over the upper surface of the margin.

Differs from *Cyp. Scottii* in its short and gibbous form, in the remarkable flat and broad cream-coloured base, in the very extended, flat and thin margins: the posterior channel has much the form of that of *Scottii*, but terminates at the apex, and not, as in *Scottii*, at the base of the spire.

Length, $2\frac{2.5}{100}$ inches; altitude, $1\frac{2.0}{100}$; breadth, $1\frac{5.0}{100}$.

Hab. —?

The only specimen I have seen of this peculiar shell is in the British Museum, and may not be an adult.

3. *CYPRÆA BICOLOR* (Two-coloured Cowrie). *Cyp. testâ pyriformi, colore floris lactis; fasciis latis, interruptis, brunneis, centrali latiori; basi latiusculâ, rotundatâ; aperturâ subspirali, latiusculâ; dentibus numerosis, prominentiusculis, columellaribus crassis, supra sulcum columellarem extensis; margine externo crasso, punctato, punctis brunneis discretis; extremitatibus brevibus, obtusis; canali antico pallidè rufescente-flavo.*

Shell pyriform, when young more ovate, smooth and shining; of a light cream-colour, having three broad, irregularly interrupted bands of a brown or fawn colour, extending entirely across the shell, the middle one being the broadest, the posterior the next so; base broad, rather convex, pale cream-colour; aperture subspiral, rather wide; teeth numerous, rather prominent, on the lip about thirty curving round its edge, and extending about one-third over the lip; on the columellar side teeth about seventeen, extending from the edge of the aperture over the columellar groove to end on its inner ridge, diminishing on that ridge in prominence towards the posterior extremity, where the denticulation is scarcely observable; the columellar groove of equal width the whole length; margin, external very thick and prominent (not crenulated), somewhat angular at its outer edge, along which are many small brown distinct spots; similarly coloured spots, but a little larger, are also on the columellar side, where a slight margin exists, and which becomes prominent only to form the anterior extremity; extremities short, obtuse; the anterior channel has a very faint orange tinge.

Long, $\frac{9.0}{100}$ ths of an inch; high, $\frac{5.5}{100}$ ths; wide, $\frac{5.5}{100}$ ths.

Hab. Australia, New Holland.

Cabinets of Metcalfe, Saul, Gaskoin.

Differs from the *Cyp. piperita* of Gray in not being cylindrical, but of a pyriform shape; in being very gibbous, and a much heavier and thicker shell; in having only three bands, which are very broad and conspicuous; *Cyp. piperita* having four, which are generally narrow and obscurely visible in the adult shell, and on the later-formed part of the shell uninterrupted.

4. *CYPRÆA GRACILIS* (Slender Cowrie). *Cyp. testâ oblongo-ovata, anticè gradatim acuminatâ, pallidè flavescente-brunnea, maculis dorsalibus irregularibus pallidè brunneis, lateribus basalibus brunneo punctatis, punctis paucis distinctis; basi pallescente; latere postico columellari subgibboso; aperturâ latiusculâ, subspirali; dentibus labii externi prominentibus æqualibus, circa octodecim, labii columellaris æqualibus, anticis paululûm majoribus, pariter circa octodecim; sulco columellari antico depresso, postico inconspicuo depresso; extremitatibus canalibus latisque prominentibus; spirâ conspicuâ, profundè umbilicatâ.*

Shell oblongo-ovate, gradually tapering towards the anterior end, smooth and shining, of a light fawn-colour, with very light brown irregular markings about the back, and a few distinct dark brown dots on the edges of the base of the shell on both sides, bands indistinct; inside of shell milk-white; base somewhat lighter in colour than the back; posterior half of the columellar side rather gibbous, outer side of base somewhat depressed in the centre portion; aperture subspiral, rather wide; teeth of the lip prominent and even, extending in no degree on to the lip (only denticulating its edge), about eighteen in number, and about as many also on the columellar side, which are larger anteriorly, even, terminating externally in a line at the edge of, or rather just within the aperture, and internally, proceeding straight across the columellar groove to terminate at its inner edge the anterior half of the shell, and on the columella in points, the posterior half, there being mere small projections indicating the continuance of the inner edge of the columellar groove, which extends the whole length of the columella, diminishing in depth in the middle of the shell, and deepening at the posterior end to form a part of the channel; margins slightly prominent, thick on the outer side only, not crenulated; extremities of a light brown colour externally, much produced and thick; both the anterior are marginated and flattened externally; channels wide and protrude beyond the body of the shell; spire visible, deeply umbilicated.

Long, $\frac{86}{100}$ ths of an inch; wide, $\frac{50}{100}$ ths; high, $\frac{40}{100}$ ths.

Hab. — ?

The only specimen I have seen of this elegant shell is in my collection, and was brought to this country by Sir E. Belcher in the 'Samarang.'

The only species with which this shell has any affinity is the *Cyp. Sauli* of Gaskoin; and differs from it in the teeth being finer, and in being rather within the aperture, in having a columellar groove, in the absence of colour between the teeth, in being more ventricose, the wanting the characteristic dark blotch on the dorsum of *Sauli*, and difference of general coloration.

I have thought it proper to add to this description the following note:—

"My dear Sir,—I have carefully examined the little *Cypræa* which you left with me yesterday, and which you proposed to name *Cyp. gracilis*. It appears to me to be in perfect condition, and to

possess several characters by which it is most easily distinguished from all other described species with which I am acquainted.

"In its teeth, which are not elongated over the columellar side, in the internal columellar groove, in its apical umbilicus, and in the much-produced posterior extremities, as well as in other characters, it differs essentially from *Cyp. Walkeri* of Gray; and it has not the slightest appearance of malformation or monstrosity of form. I am therefore of opinion it is a perfectly distinct species, and ought to be described as such.

"Yours, &c.,

"G. B. SOWERBY."

"30th March, 1848."

"To J. S. Gaskoin, Esq."

5. *CYPRÆA OBSCURA* (Dusky Cowrie). *Cyp. testā ovatā, albicante, maculis duabus dorsalibus nigricantibus inconspicuis; costellis rudibus, prominentibus, ad dorsum concoloribus, ad margines et ad basin albis; dentibus labii externi circa viginti, labii interni distantibus circa duodecim; sulco columellari lato, margine interno dentibus serrato; extremitatibus albis, crassis, productiusculis.*

Shell ovate, of a dingy white colour, having two remarkable small, blackish, undefined spots or markings on the dorsum, one a little less than a third the length of the shell from each extremity; ribs coarse and prominent, on the back of the same colour as the shell, but on the margins and base of a pure white; they traverse the shell from one side of the aperture to the other, having a slight curving at the centre of the dorsum; on the outer side several terminate on the side of the shell, fewer terminate on the columellar side, where some float; base white, rather round; aperture straightish, curved at the posterior end, rather narrow; teeth even, formed by the costæ, about twenty on the lip and about twelve on the columellar side, where they are distant and extend over a broad columellar groove to serrate its inner ridge; margin on the outer side thick and white, none on the columellar side; extremities white, thick, and somewhat produced. No dorsal impression.

Length, $\frac{3.6}{100}$ ths of an inch; altitude, $\frac{2.0}{100}$ ths; breadth, $\frac{2.5}{100}$ ths.

Hab. North-west Australia; Dupuch's Island (under stones, low water), collected by J. E. Dring, Esq., R.N. Abrolhos Island (under coral), by ditto.

Cabinets of Gaskoin, Saul, &c.

This shell is perhaps nearest in form to *Cypræa pulex*, Gray, but cannot be confounded with any known species. I have had for several years specimens of this shell, and the locality given me with them was Senegal; but as Mr. Dring has lately brought others to this country, I have thought it right to give so authenticated a habitat as we have received from him.

This manuscript description having been written for a few years, I send it for insertion in the 'Proceedings,' although Kiener appears to have described it in his work, 'Species Général,' &c., under the name of *Cyp. Napolina*, a name ascribed to Duclos; but Kiener does not say by what authority, yet I conclude that that appellation should stand. Kiener's figures, pl. 53, figs. 3 and 3, are no repre-

sentations of his description. I was not aware until lately that this shell had already been described, but my English characters of the species may not be unacceptable, as they are more minute.

6. *CYPRÆA SULCATA* (Grooved Cowry). *Cyp. testâ ovato-globosâ, ventricosâ, albâ; basi rotundatâ, aperturâ latiusculâ, posticè incurvâ, canalibus profundis et latis; dentibus æqualibus, labii externi circa triginta, lateris columellaris viginti, supra columellam continuis marginem internam serratam formantibus; costellis prominentibus plerumque ad impressionem dorsalem terminantibus, pseudo-costellis ad utramque extremitatem circa decem; sulco columellari lato, profundo, margine externo prominente, acuto; extremitatibus obtusis, crassis; spirâ conspicuâ; impressione dorsali conspicuâ.*

Shell globoso-ovate, ventricose; entirely of a clear white colour; base convex, aperture rather wide, curved inwards at the posterior end, channels deep and broad; teeth numerous and even, about thirty on the lip and twenty on the columellar side, which traverse the columellar groove to terminate at an inner serrated edge; the ribs are continuations of the teeth, are prominent, and almost all terminate at the dorsal impression, a few only on the sides of the shell; false ribs at each end about ten, interstices between the ribs minutely striated longitudinally; columellar sulcus broad and deep, the outer edge, sharp and prominent, occupies the anterior third of the length of the columella, the other portion of the inner part of the columella flat (not grooved); extremities obtuse, thick, those of the lip longer than the body of the shell, the posterior one in a marked degree, which, passing round to form the channel, ends somewhat abruptly in a prominent sharp edge on the columella, which sharp edge constitutes the inner extremity; spire perceptible, the false ribs pass over it; dorsal impression well-pronounced, extends the length of the back to the false ribs at each end; margins none.

It is nearest in general form to *Cyp. formosa* of Gaskoin, but differs from it in having a dorsal impression, much coarser ribs, in the sharp outer edge of the columellar sulcus, the peculiar position and form of the inner and projection of the outer posterior extremities, in its pure white colour, &c.

Hab. Manilla.

Length, $\frac{4.5}{100}$ ths of an inch; width, $\frac{3.2}{100}$ ths; height, $\frac{3.0}{100}$ ths.
Cabinets of Gaskoin, Cuming.

7. *CYPRÆA VITREA* (Glass-like Cowry). *Cyp. testâ ovato-globosâ, albâ, nitidâ, semivitrea; basi rotundatâ, aperturâ angustiori paululum incurvâ, marginibus crassis; dentibus æqualibus, numerosis, prominentibus, labii externi circa triginta, columellaris viginti supra sulcum columellarem continuis; sulco columellari lato, longitudinem aperturæ æquante, margine interno subrecto, serrato; costis magnis, æqualibus, prominentibus, cum dentibus continuis ad dorsum terminantibus; lineâ dorsali impressâ; extremitatibus obtusis, crassis brevibus; margine externo crasso; spirâ inconspicuâ.*

Shell ovato-globose, almost round, of an uniform, semivitreous, shining, white appearance; base convex, aperture rather narrow, slightly curved inwards its whole length, edges thick; teeth even, rather thick, prominent, about thirty on the lip and twenty on the columellar side, where they traverse the columellar groove and serrate its nearly straight inner edge; the groove is broad and very shallow, and nearly equal in width and depth the whole length of the aperture; the teeth continue to form the ribs, which are large, even and prominent, and terminate at the dorsal impression, with the exception of two or three on each side; the false ribs all form denticulations; dorsal line impressed, extending from the apices formed by the joining of the false ribs; extremities obtuse, thick and short; margin very thick, none on the inner side; spire not perceptible in the adult shell, being thickly covered by the false ribs.

Hab. Philippines.

Length, $\frac{2.5}{100}$ ths of an inch; width, $\frac{2.1}{100}$ ths; height, $\frac{2.0}{100}$ ths.

Differs from *Cypræa globosa* of Gray in the anterior extremities being of an equal length, aperture much narrower and less curved, base rounder, its semivitreous shining appearance, &c.

Cabinet of Gaskoin.

8. *CYPRÆA GRANDO* (Hail-stone Cowry). *Cyp. testâ ovato-globosâ, nitidâ, nivedâ; basi rotundatâ, sine varice; aperturâ latiusculâ anticè latiori, subspirali; sulco columellari longitudinem columellæ æquante, lato et profundo; dentibus minimis, æqualibus, labii circa quadraginta-octo, columellæ circa triginta-quatuor; costellis tenuibus et æqualibus, e dentibus continuis; interstitiis longitudinaliter tenuiterque crenulatis; lineâ dorsali impressâ; extremitate posticâ valdè productâ; spirâ prominente et flavescente.*

Shell ovato-globose, shining, of a clear snow-white colour; base round, being a continued convexity with the body of the shell, there being no margin on either side; aperture widest at its anterior half, rather wide generally; the columellar side spiral, edge of the lip but very slightly so; columellar groove extends the entire length of the columella, and is continuous at both ends with the channels; it is broad and deep, particularly at the anterior half; its outer and inner edges spiral, the outer edge angular and somewhat projecting; teeth very minute, numerous and even, about forty-eight on the lip, and about thirty-four on the columellar side, which traverse the columellar groove to notch its inner edge; the ribs delicate and even, and are continuations from the teeth; many terminate on the sides of the shell (the teeth being so numerous, the outer portion could not contain their prolongation), the rest end mostly in fine points at the dorsal impression, alternately from either side; a few are united with those of the opposite side; interstices between the ribs finely crenulated longitudinally; dorsal line impressed; extremities, the anterior very slightly, the posterior much produced; spire prominent and tinged with a light yellow colour; margins none.

This shell differs from the *Cypræa vitrea*, just described, in the minuteness and number of the teeth and delicacy of the ribs; in the

unequal width of the aperture, and the spiral form of its inner side; in the broad, deep and unequally wide columellar groove, prominent apex, absence of margin, &c.

Length, $\frac{2.6}{100}$ ths of an inch; width, $\frac{2.0}{100}$ ths; height, $\frac{1.9}{100}$ ths.

Hab. Manilla.

Cabinet of Gaskoin.

9. *CYPRÆE FLAVEOLÆ*, *varietas labro-lineata*. *Cyprææ flaveolæ varietas, lineis brunneis e dentibus labii externi supra basin continuis.*

Shell same form and size as *Cyp. flaveola*: differs from it in being much paler in colour, and the white dottings are therefore less conspicuous; in the teeth being smaller and more numerous, and in there being elevated lines of a brown colour on the lip, continued from each tooth, and at the anterior end projecting beyond the margin; in the anterior teeth of the columellar side being bifurcated, and in the dark brown dottings of the margins being more numerous, and extending a little on to the base.

Cabinets of Cuming, Saul.

Hab. — ?

10. *CYPRÆE QUADRIMACULATÆ*, Gray—*varietas pallidula* (Palish Cowry). *Cyp. sine maculis nigris; dentibus lateris columellari majoribus, prominentioribus et paucioribus; labii minoribus et numerosioribus; basi nitente.*

This shell possesses characters, especially in colouring and general form, much in common with the former shell, but is destitute of the large black spots on the outsides of the extremities and on the spire; there is in some individuals a thin dark line across the outer surface of the anterior channel; the teeth on the columellar side are larger, more prominent, more even, and fewer in number; while those on the lip are smaller and more numerous; it never attains the size of *quadrifasciata*, the teeth and base of which are always dull, while those of the variety are always polished (shining).

11. *CYPRÆA PULLA*.—The small "*Trivia*" I described under that appellation (Proc. Zool. Soc., March 10, 1846), I am enabled now to state the *habitat* of;—the Galapagos Islands, and the Bay of Guayaquil; Cuming. When I named this shell "*pulla*," I was not aware it was a synonym of *Cypræa adusta* of Chemnitz and Lamarck, by Gmelin,—*Cyp. onyx* of Gray; but as Chemnitz's name "*adusta*" was the prior, and therefore the proper one, I do not consider it necessary to alter mine.

12. *CYPRÆA PULICARIA*.—Reeve, in his description of this shell (Proc. Zool. Soc., March 10, 1846), remarks, that it differs from *Cyp. piperita* of Gray in *not being banded*; but most of the specimens that I have seen have four distinct, narrow, interrupted, light brown bands, nearly equidistant. Nine individuals, of thirteen in my collection, have these four very conspicuous bands; that described by Reeve was one of the remaining four shells whose bands are covered. I will take the liberty to add to the distinctions from *Cyp. piperita*,

the broad and projecting sulcus at the anterior portion of the columellar groove; and the convergence of the anterior extremities, rendering the channel so much narrower than in *piperita*.

13. *CYPRÆA NIVEA*.—The shell described under that appellation by Gray, the original type of which, pierced with its two holes, is now before me, is a white variety of *Cypræa turdus*:—vide Gray's Monograph (Zool. Jour. i. 511). The figures, however, of *Cypræa nivea* of Gray, in Sowerby's Conch. Illus. and in Reeve's Conch. Iconica, are representations of the *Cypræa oryza* of Gray (Zool. Jour. iii. 369); this same error seems to pervade in the arrangement of most of the collections I have seen. The *Cypræa nivea* figured in Wood's Supplement to the Index Testaceol. is a young *Cyp. Humphreysii* of Gray.

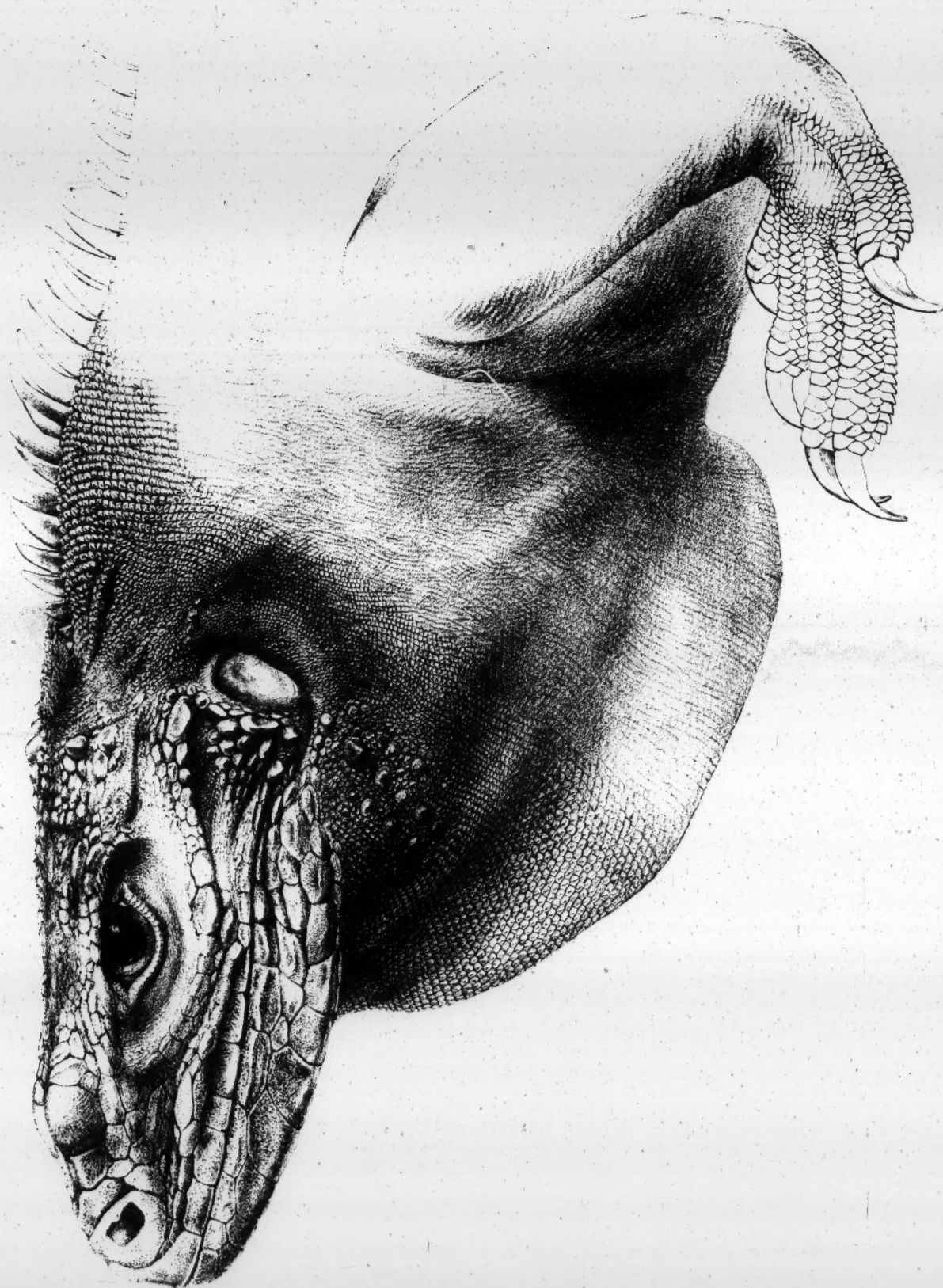
14. *CYPRÆA PRODUCTA*.—I am able at length to refer conchologists to other specimens of this species than that described by me December 22, 1836, in these 'Proceedings,' which have been brought to this country by Capt. Sir Edward Belcher, and collected during the voyage of H.M.S. the Samarang. They are distributed into the cabinets of Miss Saul, Messrs. Cuming, Gaskoin, &c. The original shell, the type of this species, is well-represented in Sowerby's Conchological Illustrations, fig. 155; in Reeve's Conchologia Iconica, pl. 24, fig. 137; and in Kiener's Species général, et Iconographie des Coquilles vivantes, fol. 53, figs. 5 and 5:—this last is copied from Sowerby.

June 27, 1848.

William Yarrell, Esq., V.P., in the Chair.

Lord Auckland communicated through the Secretary a letter which he had received from Lieut.-Col. Butterworth, the Governor of Singapore, announcing his desire to present to the Society a Black Leopard and a Tree Kangaroo (*Dendrolagus inustus*, Müller), which he intended to transmit to England by the first opportunity.

A letter was read from T. S. Boileau, Esq., H.E.I.C. Civil Service, in which he informed the Secretary of the safe arrival of a living pair of the Indian Wild Hog and an Owl (*Bubo bengulensis*), which he had brought from Madras expressly for the Society's acceptance.



The following papers were read :—

1. ON THE HABITS OF *CYCLURA LOPHOMA*, AN IGUANIFORM LIZARD.

By P. H. GOSSE.

(Reptilia, Pl. 1.)

The subject of the present paper seems to be as yet unknown to science ; it may be thus described :—

CYCLURA LOPHOMA, mihi—(λόφος, a crest, and ὤμος, the shoulder). Shields on the muzzle separated by small scales ; muzzle with four many-sided, convex, unkeeled plates on each side, the anterior and posterior very large, the intervening two smaller, short, but wide. General head-shields irregular in size, a largish one near the middle of the head ; lower jaw with one (posteriorly two) series of large, rhomboidal, keeled plates, with none between them and the labial plates. Dorsal crest high, continuous over the shoulders, interrupted over the loins.

Length about 3 feet, of which the tail measures 21 inches. Colour (in a dried state) greenish-grey, with obscure blackish spots, confluent, so as to form a rude reticulation.

This very distinct species may be at once recognised by the number, form and arrangement of the plates of the muzzle, and particularly by the serrated crest not being interrupted over the shoulders. I have never met with it alive in Jamaica ; the specimen from which the above description is taken, now in the British Museum, was one of many zoological treasures presented to me by my kind and valued friend, Richard Hill, Esq., of Spanish-town. It is to the same gentleman that I am indebted for the whole information, concerning the economy of this Saurian, which I now submit to the Zoological Society.

The following memoir from the pen of my friend was communicated to me in the beginning of the year 1846 ; the animal, though spoken of by the name *Iguana*, is the identical specimen above described, and which Mr. Hill had noticed to differ from *I. tuberculata* by its lacking the dentelations on the gular pouch.

“ Our Iguana is considered to be entirely herbivorous. It is found only in particular parts of the island. The low limestone chain of hills, along the shore from Kingston Harbour and Goat Island, on to its continuation in Vere, is its ordinary haunt ; and it is not unfrequently taken in the plains between those sea-coast hills and the more inland mountains, being found in hollow trees in the pastures, where they congregate, several of them together.

“ The labourers in clearing and burning off some of the savannas between Spanish-town and Passage-fort the other day (March 1844), surprised in a hollow bastard-cedar tree (*Guazuma ulmifolia*) some five Iguanas of the largest size. The one I sketched measured forty-five inches long, and it was said not to have been the largest. It was extremely fat and muscular. A russet-green, here and there graduating into slaty-blue, is the general colour of the body and limbs ; some oblique lines of dark olive-green are traceable on the shoulders, and three broad dark triangular patches descend from the

dentelations of the back down to the belly, with zigzag spots of dark olive-brown dispersed about. At very regular intervals, the tail is alternately of a lighter and darker olive-green. A bluish-green colour, more decided than on the body, prevails in the dentelations of the back, and on the legs.

"Succulent herbs, growing in the forests of the limestone hills I have referred to, supply food for the Iguana. These hills, however, are so little suited for this sort of vegetation, that hardly anything more than aromatic and resinous trees and balsamic plants grow there. The *lignum-vitæ* (*Guaiacum*), the *Acacia nilotica*, and cactoid plants,—particularly the torch and melon thistles (*Cactus repandus et peruvianus*, et *Cactus melocactus*),—the *lantana*, and the *varronia*, with many balmy mallows (*Sida althæifolia*, *urens*, *capillaris*, et *viscosa*), and the vervain (*Stachytarpheta*), seem to comprise almost the whole catalogue of trees, shrubs and herbs. These hills are, however, inhabited by several domestic animals, which have run wild. Goats and hogs, derived from the common domestic breeds, have become feral; and even the common domestic poultry, cocks and hens, have taken to the woods as jungle-fowl, with the pintado. Quails and doves find here a safe breeding-place. These hills are also the special resort of the musteline thrush, the wood-thrush of the North Americans, which more than divides with the mocking-bird the credit of a songster. It has a louder and more brilliant note, though its song be greatly less varied and melodious. The fruit of the torch-thistle seems the great attraction of the wood-thrush, but it is not easy to perceive the resource of the granivorous birds. The aromatic herbs suit the wild goats; but the hogs can find but few edible roots among rocks, but very thinly interspersed with soil. In the occasional hollows a little mould has been collected from decayed leaves, mingled with marl, extremely stony and sterile; and here a little more succulent herbage may prevail, and a few of the edible roots of the country may be found growing. The rocks have numerous caverns, and the springs that break out at the foot of the cliffs are an impure brackish water, though extremely transparent. Yet this district is almost exclusively the haunt of the Iguana. The occasional ones taken in the savannas are considered to be stray visitants from the neighbouring hills; they are not permanently established in the plains in which they are found.

"I have noticed the particular kind of locality which the Iguana inhabits in this part of the country, because it presents very different features from the haunts usually assigned to this lizard elsewhere. Forests on the banks of rivers, and woods around springs, where it passes its time in the trees and in the water, living on fruits, grains and leaves, are said to be the places in which the hunters find it on the American continent."

After referring to some notes of Sir R. Schomburgk made in Guiana, and to Goldsmith's graphic picture of noosing the Iguana, probably derived from Labat, which I do not here quote, because they refer to an animal *generically* distinct from ours,—my friend reverts to his own observations:—

"The gular pouch which hangs like the dewlap of a bull beneath its throat can be inflated*, but it is not exactly known under what circumstances, ordinarily, it has recourse to this power of inflation. When filled with air it would give breadth and buoyancy to the body, and if its habits are as aquatic as some accounts make them [those of *Iguana* proper] to be, it would afford to an herbivorous animal no unimportant aid while swimming and cropping 'its flowery food.' When excited it assumes a menacing attitude, and directs its eye to the object of attack with a peculiarly sinister look. At this time it inflates the throat, erects the crest and dentelations on the back, and opens the mouth, showing the line of those peculiarly-set white teeth, with serrated edges, so excellently made to illustrate the remains of the gigantic fossil *Iguanodon*. The principle of their construction is so precisely similar, as to leave no doubt of the genuine connexion of the extinct with the existing herbivorous lizard. The adaptation of both is for the cropping and cutting of vegetable food.

"In defending itself from attack, the *Iguana* converts its long flexible tail into no unimportant weapon. The dentelated upper edge, drawn rapidly over the body and limbs of an enemy, cuts like a saw. The twisted attitude which it assumes when approached is converted into a quick turn, in which movement the tail is nimbly struck by an overblow from one side to another, and then jerked round. I have observed the same application of the tail to purposes of defence in the crocodile, and there can be little doubt that the dentelated crest upon this part of the body of lizards is for the infliction of serrated wounds. The lacerations which dogs suffer in attacking the *Iguana* are remarkably severe.

"There can be no doubt that the *Iguana* voluntarily takes to the water; but whether it delights to refresh itself in that element, as we should be led to suppose by the observation that it sports in it, I cannot learn from any of our people here. The one kept in the Zoological Gardens in the Regent's Park was seen to enter and cross a small pond, the fore-feet being motionless during the animal's progress through the water. It is curious, however, that whilst the dry, sterile hills near us abound with *Iguanas*, the banks of the Rio Cobre, a river so near its haunts, are scarcely ever visited by them."

After my arrival in England, the above notes coming under review, in my study of the Saurians I had brought home, I was induced to make further inquiry of Mr. Hill, whether in describing the inflation of the pouch, and the defensive action of the tail, he spoke from his own observation. From his reply I extract the following remarks:—

".....The purposes of defence, to which I represented it as applying its long tail with its armature of pointed and triple-edged scuta, were suggested to me by the negroes, who were present when I was examining the specimen I mentioned as forty-five inches in

* I believe my friend has fallen into a common error here. If I may judge from analogy in the genera *Anolis* and *Dactyloa*, the gular pouch in the *Iguanidae* is *extensible* but not *inflatable*, as I hope to show in a future paper on the habits of these genera.—P.H.G.

length. They warned me to stand out of the reach of its tail, for they saw it was going to turn itself rapidly round to strike. I observed a peculiar sinister look it had, derived not from the eye being turned within the socket, so as to indicate the object it was regarding, but from the peculiar turn of the head, as if listening and observing. The negroes remarked that in the position in which its tail then lay, it was preparing to strike at me, and that dogs generally in setting upon them received desperate punishment, from the gashes and lacerations that were made into the thick muscles of the legs by the rapid flinging round of the Iguana in defending itself. The sudden jerk with which it drew back its tail was said to enable it to rasp the very flesh off the bone. The notion expressed about the inflation of the gular pouch was the consequence of seeing two very large Iguanas from Cuba, which distended this appendage, and let it collapse again. The skin of these animals hung about them, as if they *had been* fat, and were, at the time I saw them, emaciated

"An acquaintance has promised to supply me with notes of a pair of *Cycluras* that inhabited a hollow acacia-tree in his fields (*Prosopis juliflora*) for some sixteen months. He supposed them male and female. They differed in size and in tint; and were never, during the whole period of his acquaintance with them, seen on the outer tree both together. Like the pair of weather-indicators in the Dutchman's hygrometer, if one was out, the other was in. For a certain time every morning, one or other would be seen on some extreme eastern branch of the tree sunning itself, by basking at its length in the slant sunbeams that shot within the foliage. Their size and the nimble movement of the tail gave them so much the appearance of the ring-tailed monkey, when climbing, that a near-sighted observer, like myself, would mistake them for some Sapajou scrambling up the bark."

The intelligence thus promised has just been communicated to me, contained in the following letter from Stephen Minot, Esq., of Worcester Lodge, to Richard Hill, Esq.

"February 1848.

"Dear Sir,—In accordance with your request, I send you a few particulars relative to the two Guanas that were seen during a period of nearly two years, at Worcester Lodge, in the parish of St. Catherine.

"About the beginning of September 1844, a friend of mine, riding into the property, observed, as he thought, a large green lizard basking in the sun on a hollow cashaw-tree (*Prosopis juliflora*), close by the road. He struck at it with his riding-whip, and immediately the animal disappeared with great swiftness into the tree. For several weeks after this it was occasionally seen, but was extremely shy, always disappearing the moment any one approached the tree. I gave orders that no one should, under any pretence, frighten it again, as a servant who had seen it informed me it was a Guana. By degrees it got tamer; and when I first saw it, it was, I should think, from 10 to 11 inches long, including the tail. About a year after this period it was always visible as soon as the sun became a

little warm, clinging to the bark of the tree, or crouching (if I may use the term) along a small dry branch. I never saw it attempt to catch flies, or ants, or any insects; and the only time I ever detected it feeding was about this period. One day after heavy rain, the sun having broken through the clouds, shining very bright, it was then eating the guinea-hen-weed (*Petiveria*), growing about ten yards from the root of the cashaw. I watched it a few moments, unperceived, and observed it walk very slowly, moving one leg at a time, —cropping, and apparently swallowing without any further process, a mouthful of leaf; and leaving an indenture on the plant of the size of his mouth. Immediately on seeing me, by a succession of rapid springs, neither running nor walking, nor was it like the hopping of the frog, it regained the tree, and in a second was out of sight. The hollow part of the tree is about seven feet from the ground. It evidently did not object to the water, as there was a small lodgment of water close by where it was feeding, through which it bounded without a moment's hesitation, though it might have regained the tree, if it had disliked the water, by going round the small swamp, which was only say three or four yards in diameter. I mention this circumstance of the water, as we had previously had dreadful dry weather, and I often wondered how the animals of this description lived for want of it; and it was never visible during or immediately after rain.

“It was, as you are aware, foolishly shot, in my absence, by young N——, under the false impression that it ate chickens. I have spoken of it in the singular number, as we were not aware there were two, until Mr. N—— shot a second one on the same tree about two or three hours after he killed the first. This discovery, that there were two instead of only one, accounted for what had previously often surprised me, namely that sometimes the animal was of a brownish-green hue, and when of that colour always appeared larger than when it looked blackish. It therefore appears plain that they must have been male and female; and, if that is correct, the male was by far the largest and handsomest.

“The male, as I consider it, was the one I saw dead after it was shot. It was about from 22 to 24 inches long, but the tail did not appear so long in proportion, as it grew older, as it seemed when first discovered. I opened the animal, and found it full of pieces of guinea-hen-weed, some digested, some half-digested, and a large quantity quite fresh, which is accounted for by its being early in the morning, say nine o'clock, when it was shot. I may mention that I put the carcass into three or four different sorts of ants' nests,—the common, the stinging black, and the large red ant,—not one of which would touch it; and when I forced them into the carcass, and put part of their nests in it, they ran away from it as quickly as possible. I did this under the hope of getting his skeleton.”

To this last observation Mr. Hill has appended the following note : —“This dislike for the flesh of the lizard may have resulted from the odour of the guinea-hen-weed, on which it had recently fed.

The whole flesh would be imbued with the intolerable garlic-like scent."

2. DESCRIPTIONS OF TWENTY-THREE NEW SPECIES OF VITRINA, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. VITRINA CUMINGII, Beck MSS. *Vitr. testâ depresso-globosâ, tenuissimâ, subtiliter striatâ, nitidâ, albido-cornedâ; spirâ brevissimâ, obtusâ; suturâ levi, lined impressâ marginatâ; anfractibus 4 vix convexiusculis, ultimo inflato, subdepresso, medio lined rufâ cingulato; aperturâ parùm obliquâ, lunato-rotundatâ; peristomate simplice, marginibus remotis, columellari subverticali, leviter arcuato, supernè reflexiusculo, perforationem punctiformem simulante, supero antrorsum vix arcuato.*

Diam. 20, altit. 12 mill.

Hab. The island of Bohol; collected by Mr. Cuming.

2. VITRINA MARGARITA, Beck MSS. *Vitr. testâ depresso-globosâ, tenuissimâ, striatulâ, nitidâ, pellucidâ, carneo-hyalinâ; spirâ parvulâ, planiusculâ; suturâ lineari; anfractibus $3\frac{1}{2}$ subplanis, rapidè accrescentibus, ultimo magno, inflato; aperturâ obliquâ, lunato-subcirculari; peristomate tenuissimo, margine supero antrorsum dilatato, columellari leviter arcuato.*

Diam. 14, altit. 8 mill.

Hab. The island of Guimaras; collected by Mr. Cuming.

3. VITRINA SMARAGDULUS, Beck MSS. *Vitr. testâ depressiusculâ, tenui, vix striatulâ, non nitente, diaphandâ, aureo-virente; spirâ parvulâ, planiusculâ; suturâ leviter impressâ, angustissimè marginatâ; anfractibus $3\frac{1}{2}$ planiusculis, rapidè accrescentibus, ultimo utrinque planiusculo, basi lato; aperturâ parùm obliquâ, rotundato-lunari, latiore quam altâ; peristomate tenui, subinflexo, margine supero antrorsum dilatato, columellari vix recedente, leviter arcuato.*

Diam. 12, altit. 7 mill.

Hab. The island of Negros; collected by Mr. Cuming.

4. VITRINA BICOLOR, Beck MSS. *Vitr. testâ subglobosâ, tenui, sublaevigatâ, nitidissimâ, carneo-albidâ; spirâ brevi, convexâ, obtusâ; suturâ impressâ; anfractibus $3\frac{1}{2}$ rapidè accrescentibus, ultimo inflato, anticè hyalino, basi angustiusculo, membranaceo-marginato; aperturâ vix obliquâ, lunato-rotundatâ; peristomate tenuissimo, margine dextro regulariter rotundato, columellari recedente, perarcuato.*

Diam. 18, altit. 10 mill.

(Body of the animal white, apex black.)

Hab. Isle of Guimaras; collected by Mr. Cuming.

5. VITRINA GUIMARASENSIS, Pfr. *Vitr. testâ depresso-semiglobosâ, tenui, striatulâ, subdiaphandâ, virenti-carnedâ; spirâ parvulâ, parùm elevatâ; suturâ marginatâ; anfractibus vix 4 subplanis,*

rapidissimè accrescentibus, ultimo inflato, subdepresso; aperturâ obliquâ, lunato-subcirculari, æquè altâ ac latâ, intus submargari-tated; peristomate tenuissimo, margine dextro regulariter arcuato, columellari recedente, perarcuato.

Diam. 15, altit. 8 mill.

Hab. Isle of Guimaras; collected by Mr. Cuming.

6. *VITRINA BECKIANA*, Pfr. (*Vitr. peraffinis*, Beck MSS.) *Vitr. testâ depresso-globosâ, circuitu ovali, tenuissimâ, striatâ, pellucidâ, nitidâ, pallidissimè rubello-corned; spirâ mediocri, brevi, obtusâ; anfractibus ferè 4 vix convexiusculis, celeriter accrescentibus, ultimo subdepresso, basi lato; aperturâ parùm obliquâ, lunato-rotundatâ, latiore quam altâ; peristomate simplice, marginibus remotis, supero regulariter arcuato, columellari supernè reflexiusculo, basi recedente, perarcuato.*

Diam. 16, altit. 8 mill.

Hab. The Philippine islands of Negros, Siquijor and Guimaras; collected by Mr. Cuming.

7. *VITRINA POLITISSIMA*, Beck MSS. *Vitr. testâ globoso-depressâ, solidâ, lævigatâ, politissimâ, diaphanâ, corned, saturatius radiatâ; spirâ mediocri, convexâ; suturâ impressâ, submarginatâ; anfractibus 4 convexiusculis, celeriter accrescentibus, ultimo depresso-rotundato, basi lato; aperturâ obliquâ, lunato-rotundatâ, æquè altâ ac latâ; peristomate simplice, margine superiore antrosum arcuato, columellari leviter arcuato.*

Diam. 14, altit. $7\frac{1}{2}$ mill.

From the island of Zebu; collected by Mr. Cuming on the leaves of small trees. The entire animal is black.

8. *VITRINA LEYTENSIS*, Beck MSS. *Vitr. testâ depressâ, circuitu ovali, tenuissimâ, lævigatâ, nitidissimâ, lutescenti-corned; spirâ planiusculâ, vix elevatâ; suturâ leviter impressâ; anfractibus 3 rapidè accrescentibus, ultimo supernè subplano, basi convexiore, latiusculo; aperturâ parùm obliquâ, rotundato-lunari, latiore quam altâ; peristomate tenuissimo, margine supero parùm arcuato, columellari supernè reflexiusculo, basi cum inferiore angulum obtusum formante.*

Diam. 13, altit. 7 mill.

From the island of Leyte. A larger variety, more opaque, yellowish-whitish, from Siquijor. Collected by Mr. Cuming.

9. *VITRINA GUTTA*, Pfr. *Vitr. testâ depresso-globosâ, tenuissimâ, glaberrimâ, nitidissimâ, hyalinâ; spirâ vix elevatiusculâ; suturâ lineari, angustè marginatâ; anfractibus $3\frac{1}{2}$ pluniusculis, rapidè accrescentibus, ultimo magno, depresso-rotundato, basi latiusculo; aperturâ parùm obliquâ, lunato-circulari; peristomate simplice, undique regulariter arcuato, margine columellari intrante, supernè reflexiusculo.*

Diam. 11, altit. 6 mill.

From Sorsogon, isle of Luzon; collected by Mr. Cuming.

No. CLXXXVII.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

10. *VITRINA RUFESCENS*, Pfr. *Vitr. testá depresso-globosá, tenuissimá, plicatulá, nitidá, pellucidá, rufescente; spirá breviter conoidedá, obtusiusculá; suturá impressá; anfractibus ferè 4 convexiusculis, celeriter accrescentibus, ultimo ventroso; aperturá vix obliquá, lunato-subcirculari; peristomate tenui, subinflexo, marginibus remotis, supero regulariter, columellari leviter arcuato.*

Diam. 13, altit. 8 mill.

From the isle of Mindoro; collected by Mr. Cuming.

11. *VITRINA CRENULARIS*, Beck MSS. *Vitr. testá depressá, tenuissimá, glabrá, nitidá, pellucidá, aureá; spirá planá; suturá leviter impressá; anfractibus $3\frac{1}{2}$ planiusculis, juxta suturam plicato-crenulatis, rapidè accrescentibus, ultimo depresso, basi lato; aperturá obliquá, rotundato-lunari, latiore quam altá; peristomate tenui, subinflexo, margine supero antrorsum dilatato, columellari leviter arcuato, basali strictiusculo.*

Diam. 13, altit. 7 mill.

From the Philippine islands of Negros and Zebu; collected by Mr. Cuming.

12. *VITRINA RESILIENS*, Beck MSS. *Vitr. testá depressá, tenuissimá, subtilissimè et confertim plicatulá, nitidá, pellucidá, virenti-straminea; spirá planiusculá; suturá leviter impressá; anfractibus $3\frac{1}{2}$ subplanis, ultimo lato, depresso, basi ferè omninò membranaceo; aperturá obliquá, lunato-ovali; peristomate simplicissimo, margine columellari statim procedente, leviter arcuato.*

Diam. 11, altit. $6\frac{1}{2}$ mill.

From Sibonga, island of Zebu. Found on leaves of small palms in dark woods. The body of the animal is white, the apex black (H. Cuming).

13. *VITRINA PAPILLATA*, Pfr. *Vitr. testá depressá, tenui, leviusculá, nitidá, pellucidá, pallidè cornedá; spirá planiusculá, medio papillatá; suturá profundè impressá, marginatá; anfractibus $3\frac{1}{2}$ convexiusculis, prope suturam striatulis, ultimo depresso, lineis obsoletis spiralibus interdum sculpto, peripheriá rotundato, basi latiusculo; aperturá perobliquá, amplá, rotundato-lunari, latiore quam altá; peristomate tenui, margine supero antrorsum dilatato, columellari recedente, perarcuato.*

Diam. 10, altit. 5 mill.

From Calauang, isle of Luzon; collected by Mr. Cuming.

14. *VITRINA PLANULATA*, Pfr. *Vitr. testá depressissimá, subdiscoideá, leviusculá, nitidá, cornedá; spirá planiusculá; suturá impressá; anfractibus 3 vix convexiusculis, rapidissimè accrescentibus, ultimo depresso, basi angusto; aperturá amplissimá, perobliquá, lunari, transversè dilatatá; peristomate tenui, margine supero antrorsum dilatato, columellari valdè recedente, arcuato.*

Diam. 11, altit. $4\frac{1}{2}$ mill.

From Calauang, isle of Luzon; collected by Mr. Cuming.

15. *VITRINA APERTA*, Beck MSS. *Vitr. testā depressissimā, superne convexiusculā, basi apertā, laevigatā, subopacā, virenti-albidā; spirā minūtā, laterali; suturā levi; anfractibus 2½ convexiusculis, basi angustissimis, apertis, ultimo permagno, planē fornicato; aperturā horizontali, auriformi, usque in verticem apertā; peristomate simplicissimo.*

Diam. 11, altit. 3 mill.

From San Juan, isle of Luzon; collected by Mr. Cuming.

16. *VITRINA MONTICOLA*, Benson MSS.? *Vitr. testā depressā, tenui, striatūlā, nitidā, pellucidā, lutescenti-corneā; spirā planā, medio vix prominulā; suturā leviter impressā; anfractibus 4 celeriter accrescentibus, planiusculis, ultimo depresso, non descendente; aperturā obliquā, rotundato-lunari; peristomate simplice, marginibus conniventibus, callo tenuissimo junctis, supero antrorsum arcuato-dilatato, columellari cum basali angulum obtusum formante.*

Diam. 18, altit. $7\frac{1}{2}$ mill.

From Bengal, Landour, Himalayah, Almorah.

17. *VITRINA BENSONI*, Pfr. *Vitr. testā depressiusculā, tenui, striatūlā, nitidā, pellucidā, pallidē corneā; spirā vix elevatā, obtusā; suturā impressā, submarginatā; anfractibus 3½ convexiusculis, ultimo subdepresso, peripheriā rotundato, basi lato; aperturā obliquā, lunato-subcirculari; peristomate simplice, subinflexo, marginibus conniventibus, supero antrorsum subdilatato, columellari recedente, perarcuato.*

Diam. 12, altit. vix 6 mill.

In the Botanic Garden of Calcutta; collected by Mr. Benson.

18. *VITRINA HIANIS*, Rüppell MSS. *Vitr. testā depresso-globosā, tenui, striatūlā, pellucidā, nitidulā, pallidē corneā, strigis saturatioribus radiatā; spirā parvulā, conoideo-convexā; suturā impressā, marginatā; anfractibus 4 convexiusculis, rapidē accrescentibus, ultimo rotundato, basi latiusculo; aperturā obliquā, lunato-subcirculari; peristomate simplice, marginibus convergentibus, columellari subrecedente, leviter arcuato.*

Diam. 24, altit. 12 mill.

From Abyssinia; collected by Dr. Rüppell.

19. *VITRINA RÜPPELLIANA*, Pfr. *Vitr. testā subsemiglobosā, tenui, arcuato-striatā, pellucidā, parūm nitidā, fulvā; spirā brevī, obtusiusculā; suturā impressā; anfractibus 3 convexiusculis, rapidē accrescentibus, ultimo ventroso, basi latiusculo; aperturā obliquā, lunato-rotundatā; peristomate simplice, margine supero ferē angulatim antrorsum dilatato, columellari substrictē recedente, basi leviter arcuato; margine interno anfractuum inconspicuo.*

Diam. 18, altit. 10 mill.

From Abyssinia; found by Dr. Rüppell.

20. *VITRINA SOWERBYANA*, Pfr. *Vitr. testā depressā, subauriformi, arcuatim plicatūlā, tenuissimā, nitidā, pellucidā, brunneo-*

fulvâ; spirâ vix emersâ; suturâ profundè impressâ; anfractibus 3, primis convexiusculis, ultimo depresso, peripheriâ angulato, basi convexiore; aperturâ amplâ, perobliquâ, lunato-ovali, marginibus conniventibus, supero vix dilatato, columellari perarcuato, angustè membranaceo-marginato; margine interno anfractuum inconspicuo.

Diam. 22, altit. 11 mill.

From West Africa.

21. VITRINA GRANDIS, Beck MSS. *Vitr. testâ depressâ, tenuiusculâ, radiatim subtiliter plicatâ, diaphanâ, non nitente, albido-stramineâ; spirâ brevissimâ, vix emersâ, subpapillatâ; suturâ impressâ; anfractibus $3\frac{1}{2}$ rapidè accrescentibus, subplanatis, ultimo depresso, peripheriâ obsolete angulato, basi lato, striatulo, nitido; aperturâ parùm obliquâ, latâ, lunari; peristomate simplice, margine supero antrorsum subdilatato, columellari subverticaliter descendente, arcuatim in basalem abiente.*

Diam. 18, alt. 8 mill.

From West Africa, Guinea.

22. VITRINA ABYSSINICA, Rüppell MSS. *Vitr. testâ depresso-ovatâ, sublavigatâ, diaphanâ, vix nitidulâ, sordidè virenti-corned; spirâ brevi, convexiusculâ; suturâ leviter impressâ; anfractibus $2\frac{1}{2}$ convexiusculis, celeriter accrescentibus, ultimo peripheriâ rotundato, basi latiusculo; aperturâ obliquâ, rotundato-lunari, transversè dilatatâ; peristomate simplice, margine supero subrependo, columellari recedente, arcuato.*

Diam. 10, altit. $5\frac{1}{2}$ mill.

From Abyssinia; collected by Dr. Rüppell.

23. VITRINA VIRENS, Pfr. *Vitr. testâ depressiusculâ, subsemiovali, subtilissimè striatâ, nitidulâ, corneo-virente; spirâ planiusculâ; suturâ vix impressâ; anfractibus 3 vix convexiusculis, rapidè accrescentibus, ultimo subdepresso-rotundato, basi angustè membranaceo-marginato; aperturâ obliquâ, lunato-subcirculari; peristomate tenui, subinflexo, undique regulariter arcuato.*

Diam. 16, altit. 8 mill.

Locality unknown.

3. DESCRIPTION OF A NEW HELIX AND STREPTAXIS, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. HELIX STRANGEI, Pfr. *H. testâ latè umbilicatâ, depressâ, solidiusculâ, supernè confertim costulato-striatâ, nitidâ, castaneco-cornedâ, subpellucidâ; spirâ parùm elevatâ, obtusiusculâ; anfractibus 5 vix convexiusculis, ultimo subdepresso, basi sublavigato; aperturâ subobliquâ, lunato-ovali; peristomate simplice, recto, tenui, marginibus conniventibus.*

Diam. 24, altit. 10—11 mill.

From Brisbane Water, New South Wales (Mr. Strange).

2. STREPTAXIS UBERIFORMIS, Pfr. *Str. testâ profundè rimato-*

perforatâ, subsemiglobosâ, basi ferè circulari, supernè obliquè confertim costulato-striatâ, striis subtilissimis subdecussatâ, tenui diaphanâ, pallidè virenti-corneâ; spirâ subconoidedâ, obtusâ; anfractibus $6\frac{1}{2}$ convexiusculis; ultimo deviante, basi subplanulatâ lævigatâ; aperturâ parùm obliquâ, lunato-ovali, edentulâ; peristomate simplice, breviter expanso-reflexo, marginibus remotis, supernè subconvergentibus.

Diam. 18, altit. 12 mill.

From the Brazils.

4. DESCRIPTION OF FOURTEEN NEW SPECIES OF HELICEA, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. *HELIX VITELLINA*, Pfr. *Hel. testâ angustissimè umbilicatâ, depresso-globosâ, supernè minutissimè decussatâ, vix nitidâ, fuscescenti-vitellinâ; spirâ breviter conoidedâ, obtusiusculâ; anfractibus $5\frac{1}{2}$ convexiusculis, ultimo anticè subdescendente, infra peripheriâ vix striatâ, juxta umbilicum contractum albo; aperturâ obliquâ lunato-rotundatâ; peristomate simplice, marginibus remotis, columellari albo, incrassato-reflexo, supernè subdilatatâ.*

Diam. 29, altit. 18 mill.

Locality unknown.

2. *HELIX GEMMA*, Pfr. (*Vitrina suturalis*, Beck MSS.) *Hel. testâ subperforatâ, conoideo-orbiculatâ, tenui, lævigatâ, nitidâ pellucidâ, virenti-hyalinâ; spirâ depresso-conoidedâ; suturâ submarginatâ; anfractibus 4 vix convexiusculis, sensim accrescentibus, ultimo non descendente; aperturâ parùm obliquâ, rotundato-lunatâ; peristomate simplice, recto, margine columellari brevi, arcuatâ, supernè reflexiusculo.*

Diam. 9, altit. 5 mill.

From the islands of Luzon and Camiguing; collected by Mr. Cuming.

3. *HELIX SUBFUSCA*, Pfr. (*Vitrina subfusca*, Beck MSS.) *Hel. testâ subperforatâ, depressâ, tenui, subtiliter striatâ, pellucidâ corneo-fusâ; spirâ vix elevatâ; suturâ levi, submarginatâ; anfractibus $4\frac{1}{2}$ vix convexiusculis, celeriter accrescentibus, ultimo peripheriâ rotundatâ, anticè non descendente; aperturâ subobliquâ latè lunari; peristomate simplice, tenui, recto, marginibus connatis, ventibus, dextro subsinuato, columellari subverticali, supernè vix reflexiusculo.*

Diam. $11\frac{1}{2}$, altit. $6\frac{1}{3}$ mill.

From Sorsogon, isle of Luzon; collected by Mr. Cuming.

4. *HELIX VARGASIANA*, Pfr. *Hel. testâ subobtectè perforatâ, conicè globosâ, costulatâ, opacâ, cretacè, fasciis nonnullis obsoletis griseis notatâ; spirâ conicâ, obtusâ; anfractibus $5\frac{1}{2}$ convexis, ultimo inflato, anticè descendente; aperturâ lunato-rotundatâ; peristomate simplice, margine supero et dextro rectis, basali breviter, columellari latissimè reflexo, subverticali, perforationem ferè tegente.*

Diam. 13, altit. $8\frac{1}{2}$ mill.

From the island of Porto Sancto; collected by Count Vargas.

5. *HELIX CALCAREA*, Pfr. *Hel. testá perforatá, depresso-globosá, striatulá, lineis impressis obsoletè reticulatá, opacá, calcared; spirá breviter conoideá, acutiusculá; anfractibus 5 convexiusculis, ultimo peripheriá subcarinato, anticè vix descendente; aperturá subverticali, latè lunari; peristomate simplice, margine supero leviter arcuato, basali breviter, columellari paulò latius reflexo, declivi.*

Diam. 15, altit. 10 mill.

From Porto Sancto; collected by Count Vargas.

6. *HELIX CASTA*, Pfr. *Hel. testá imperforatá, depressá, utrinque subæqualiter convexá, carinatá, striatulá, nitidá, sub epidermide deciduá pallide lutescente albá; suturá lineari, cretaceá; anfractibus 4 subplanis, ultimo juxta suturam et infra carinam obsoletè angulato; columellá brevi, declivi, excavatá, basi subtortá; aperturá subtrapeziá; peristomate expanso, albo, margine basali leviter arcuato, cum columellá angulum formante.*

Diam. 47, altit. 23 mill.

Locality unknown.

7. *HELIX ANOMALA*, Pfr. *Hel. testá umbilicatá, depressá, carinatá, solidá, utrinque convexiusculá, granulatá, violaceo-fuscá; anfractibus 5 convexiusculis, ultimo undique soluto, anticè subitò descendente, basi constricto, profundè 4-scrobiculato; umbilico cylindrico, aperto; aperturá horizontali, transversè pyriformi; peristomate crasso, continuo, hepatico, undique latè expanso, margine basali profundè quadridentato.*

Diam. 24, altit. 11 mill.

From Jamaica. Nearly allied to *H. sinuata*, but differing in the umbilicus and the form of the mouth. Nevertheless it may possibly be a monstrous variety of that shell.

8. *BULIMUS IMPERATOR*, Pfr. *Bul. testá imperforatá, ovato-conicá, solidá, striatulá, strigis nigris, fulvis et albidis alternantibus, interdum interruptis elegantissimè pictá; spirá elongato-conicá, acutiusculá; anfractibus 6, superioribus planiusculis, 2 ultimis convexis, ultimo spirá multò breviorè; columellá subverticali, basi extrorsum subdentatá, carneo-lividá; aperturá truncato-ovali, intus cærulescente; peristomate latè expanso, nigro-marginato, margine dextro vix arcuato.*

Long. 68, diam. 38 mill.

From the Philippine Islands.

9. *BULIMUS MONOZONUS*, Pfr. *Bul. testá imperforatá, conoideo-ovatá, solidulá, longitudinaliter obliquè plicatá, saturatè castanèa; spirá conoideá, obtusá; anfractibus $5\frac{1}{2}$ convexis, ultimo spirá paulò breviorè, ad peripheriam cingulo lato albo ornato; columellá subverticali, basi extrorsum subtuberculatá; aperturá lunato-ovali, intus margaritaceá; peristomate obtuso, vix expansiusculo, margine basali cum columellá angulum obtusum formante.*

Long. 52, diam. 32 mill.
From the Philippine Islands.

10. *BULIMUS LEPTOCHILUS*, Pfr. *Bul. testá imperforatá, oblongo-ovatá, solidá, striatá et malleatá, sub epidermide olivacescente castaneo-marmoratá; spirá elongato-conicá, obtusá; anfractibus 6 vix convexiusculis, ultimo spiram vix superante; columellá recedente, obsoletissimè plicatá; aperturá oblongá, angustá; peristomate breviter expanso, simplice, tenui, pallidè carneo, marginibus callo tenuissimo junctis.*

Long. 98, diam. 40 mill.

From La Baja, province of Pamplona, New Granada (Funk).

Nearly allied to *Bul. Moritzianus*, Pfr.

11. *BULIMUS COSTATUS*, Pfr. *Bul. testá vix perforatá, solidá, cylindraceo-turritá, longitudinaliter subconfertim costatá, nitidá, cinerascens-carned; spirá elongatá, obtusá; anfractibus $8\frac{1}{2}$ planiusculis, ultimo $\frac{1}{3}$ longitudinis vix æquante; columellá supernè dentato-plicatá; aperturá oblongá, intus fuscá; peristomate breviter expanso, margine dextro supernè arcuato, tum strictiusculo, columellari dilatato, reflexo, perforationem ferè tegente.*

Long. 18, diam. $5\frac{1}{2}$ mill.

From the Brazils.

12. *ACHATINA REEVEANA*, Pfr. *Ach. testá oblongo-turritá, tenui, sublævigatá, sub lente spiraliter subtilissimè striatá, nitidá, sub epidermide fugace, lutescente albidá, luteo-bifasciatá; spirá sub-turritá, obtusá; suturá regulariter crenulatá; anfractibus $7\frac{1}{2}$, omnibus convexiusculis, ultimo $\frac{3}{7}$ longitudinis subæquante; columellá tenui, strictiusculá, brevissimè truncatá; aperturá truncato-ovali; peristomate tenuissimo.*

Long. 48, diam. 22 mill.

From West Africa. Very similar to *Ach. alabaster*, Rang.

13. *ACHATINA PORTORICENSIS*, Pfr. *Achat. testá turrito-oblongá, lævigatá, lineis longitudinalibus impressis irregulariter sculptá, nitidá, pallidè corneá, strigis saturatioribus ornatá; spirá elongatá, obtusiusculá; anfractibus 8 planiusculis, ultimo $\frac{1}{3}$ longitudinis paulò superante; columellá antrorsum arcuatá, prope basin aperturæ abruptè truncatá; aperturá elliptico-semiovali; peristomate simplice.*

Long. 20, diam. 7 mill.

From St. John's, Portorico (under stones).

14. *CLAUSILIA SIEBOLDTI*, Pfr. *Claus. testá arcuato-rimatá, fusiformi, solidá, confertim costulatá, vix nitidá, corneo-fuscá; spirá sensim attenuatá, acutá; anfractibus 10 convexis, ultimo penultimum non superante, basi rotundato, obsoletè gibbo; aperturá magná, pyriformi; lamellis mediocribus, convergentibus; lunellá profundá, arcuatá, extus conspicuá; plicá palatali 1 mediocri,*

subcolumellari inconspicud; peristomate continuo, libero, albo, expanso, reflexiusculo.

Long. 18, diam. 4 mill.

From Japan (Sieboldt).

July 11, 1848.

R. C. Griffith, Esq., in the Chair.

A letter was read from the Right Hon. Sir George Clerk, Bart., V.P., in which he informed the Secretary of Lord Hardinge's intention of placing under the care of the Society a living specimen of the Monaul (*Lophophorus impeyanus*), which he had brought with him from India.

A letter was read from Admiral Bowles, V.P., announcing the presentation of three living specimens of *Haliaetus aguius* (Temm.), and a male Condor, by Rear-Admiral Sir George Seymour.

The following papers were communicated to the Meeting :—

1. ON THE OCCURRENCE AND HABITS OF *VESPERTILIO EMARGINATUS*.
BY R. F. TOMES.

The specimen of a Bat, the habits of which I am about to describe, was taken in Warwickshire, near Stratford-on-Avon, whilst flitting around the tops of some high elms by the Avon-side on the 20th of June, 1847. It was in company with several others when I succeeded in shooting it, which I found very difficult on account of their exceedingly crooked, irregular mode of flight.

I believe I have never seen one of these flying in open places in a straightforward manner, as the commoner species, the Noctule and Pipistrelle, usually do; but they follow intimately and exactly the extremities of the top branches of high elm or ash trees, always in the most sheltered and quiet spots, never appearing on the windward side of a tree, even on the calmest evening. They seem of a much more social disposition than any other kind of Bat, being usually in parties of about half-a-dozen, and all of them most commonly hawking round the same tree for a few minutes, then moving off to the next, and so on till all the trees of the group have been searched; and then a re-examination of the same trees takes place.

As above stated, their flight is never straight, even for a moment, but is excessively vacillating and butterfly-like, though rather slow,—performed, as I believe, with the head directed towards the centre of the tree, so that they in fact fly in a sideward direction. From this circumstance I conclude that they take their food, which consists of

very minute gnats, while resting on the outer leaves, or when about to settle on them.

If watched very closely for a little time, they move on to some other tree, appearing to shun observation very carefully.

Gilbert White, I think, remarked of the Noctule, that it usually came abroad later than the Pipistrelle, which I can from personal experience affirm to be the case. The species now under consideration is even later than the Noctule, seldom being seen until the latter has been abroad for an hour; so late that, excepting on very clear evenings, there is little chance of either observing or obtaining specimens.

It is probable that they may be seen during the greater part of the summer months, for I remember to have seen and particularly noticed them for a long time before I thought of shooting one, and also for a considerable length of time afterwards. They may at any time be known by a person at all conversant with the method of flight of the different species of Bats, by their unsubstantial, butterfly-like appearance.

Both the specimens which came into my possession in the way alluded to were females, and on dissection contained a single foetus, about half an inch in length; yet even at this early age the membranes were considerably developed, and all the parts bore nearly the same relative proportion to each other as in the adult.

The auricle of the ear appeared to be nearly, if not quite fully formed, and folded forward over the eyes, reaching almost to the end of the nose.

When skinned and dissected this Bat was quite free from all unpleasant smell.

DIMENSIONS.

	in.	lin.
Length of the head and body	1	7½
Length of head	0	7½
Length of tail	1	6½
Length of the auricle	0	6
Width of ditto	0	3½
Length of the tragus	0	4
Width of ditto	$\frac{1}{10}$	0
Extent of wings	9	2½
Length of the humerus	0	9
Length of the thumb	0	2
Length from the point of the under jaw to the angle of the mouth, being the gape-line	0	3

DENTITION.

$$i. \frac{4}{6}; c. \frac{2}{2}; f. m. \frac{6}{6}; m. \frac{6}{6} : \text{total } \frac{18}{20}.$$

Since the specimen obtained by Brongniart in the neighbourhood of Dover, none are recorded as having occurred till the present time, with the exception of a single specimen mentioned by Professor MacGillivray, from Winchester, and described by him in the 'Naturalists' Library,' vol. xvii. He there states that the ears have "a semi-

circular lobe at the base of their outer side, and a wide and deep sinus in their upper half," which certainly is not the case with my specimens, the notch being neither wide nor deep, nor the lobe at the base at all distinctly marked. Neither is there any great resemblance to Mr. Bell's figure, taken from Brongniart's; the ears in that being much narrower in proportion to their length, with the sinus near the top of the outer side. It agrees however very nearly with the description and figure given by the latter naturalist from the specimen found by him near Dover, and there can be no doubt of its identity with his specimen of *Vespertilio emarginatus*.

2. ON THE SPECIES OF THE GENUS PLACENTA OF RETZIUS.

By J. E. GRAY, ESQ., F.R.S. ETC. ETC.

(Mollusca, pl. 1. fig. 1.)

Lamarck describes three species of this genus, depending on the general outline and the waved or flat form of the shell, characters which are liable to considerable variations, as may be found on the mere inspection of any considerable number of specimens.

I have observed that the hinge forms a more permanent character, and affords the means of dividing the species into two sections, and furnishes characters which separate them from each other. In both subgenera the right valve is the flattest, and bears the ridges of the hinge.

Sect. I. *Placuna*, sp. Lamk. = *Ehippium*, Chemn.; *Placenta* β , Schum. Shell purplish, subopaque; hinge-ridges rapidly diverging from one another at about the angle of 45 degrees. Muscular scar under the centre of the hinge. The ridges of nearly equal length.

1. *Placenta Sella*.—Shell flexuous, outline rather rhombic, being straight in front and rather notched behind; the ridges of the hinge not longer than they are separate from each other at the base.

Anomia Sella, Gmelin, S. N. 3345, 1788.

Placuna Sella, Lamk. Hist. N. 2.

Ehippium anglicanum maximum, Chemn. C. viii. t. 79. f. 714. cop. E. M. t. 174. f. 1.

Placenta Ehippium, Retz. 1788.

Inhab. China, India.

β . Shell nearly flat, subquadrangular.

Inhab. Australia. Brit. Mus.

2. *Placenta papyracea*; *Placuna papyracea*, Lamk. Hist. N. 2 = *Ehippium parvum*, Chemn. Conch. viii. t. 79. f. 719. cop. E. M. t. 174. f. 2.

3. *Placenta Lincolnii*.—Shell flat, outline suborbicular, rounder before and behind; ridges of the hinge elongate, longer than they are separate from each other at the base.

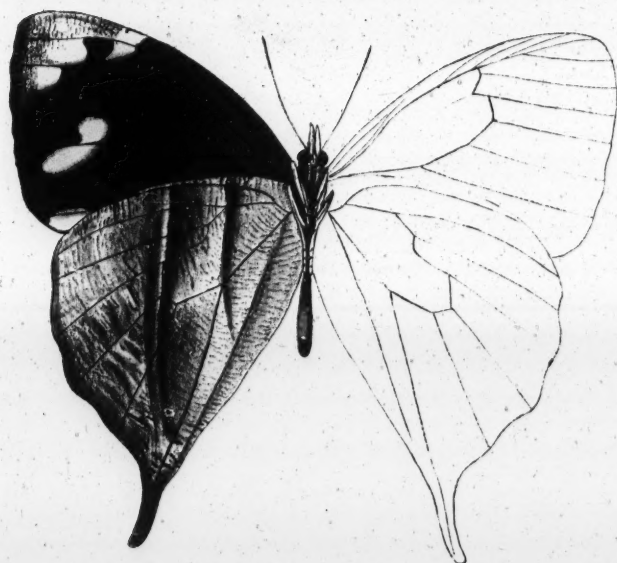
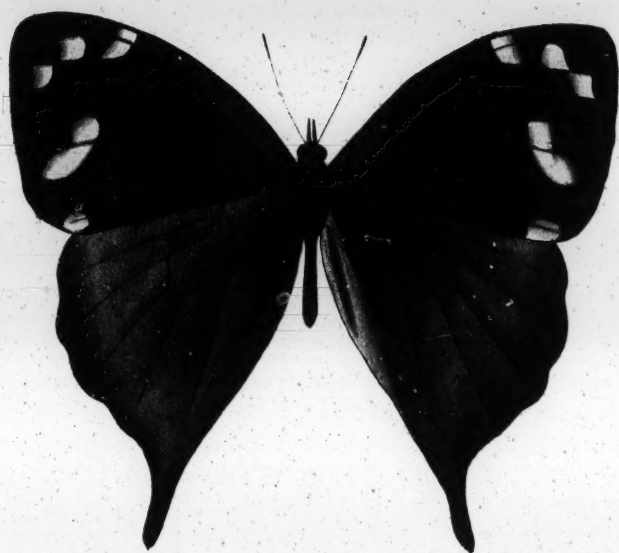
Inhab. Australia; Mr. W. Davison. British Museum.

I wish to name this species after my excellent friend Mr. Abraham Lincoln, who kindly presented me with the specimen here described, and who is well known for his fondness for conchology and the liberality with which he allows persons to use his extensive collection.





1. PLACENTA LINCOLNII Gray



W. C. Hewitson del. et lith.

Printed by Hallman & Walton

CORADES ENYO. Hewitson

Sect. II. *Placenta*; *Placenta*, Schum. *Shell semitransparent, flat, outline suborbicular; ridges of the hinge very gradually diverging from each other, the hinder ridge much the longest. Muscular scar rather in front of the middle of the hinge.*

1. *Placenta orbicularis*, Retz.; *Placuna placenta*, Lamk. Hist. N. 3; *Anomia placenta*, Linn. S. N. 1154; Chemn. Conch. viii. t. 79. f. 176. cop. E. M. t. 173. f. 2.

Shell colourless, semitransparent; when young, pale purplish.

Inhab. China. N.W. Coast of Australia; *Earl of Derby*. Port Essington.

The shells vary a little in the inequality of the hinge-ridges, but the hinder is always the longest.

I may remark that Chemnitz gives the best character for the species, and has observed the character furnished by the hinge, which has been overlooked by Lamarck, and, as far as I am aware, by all recent authors.

July 25, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read:—

1. DESCRIPTION OF A NEW GENUS AND SPECIES OF SATYRIDÆ.

By W. HEWITSON, ESQ.

(*Annulosa*, pl. 4.)

The genus *Corades*, which Mr. E. Doubleday has named and kindly characterized for me, comprises but few species of butterflies, most of which are of recent occurrence. They are from the mountainous districts of Columbia and Venezuela, where, like our European *Hipparchias* of the same family, they delight in the alpine districts. They are remarkable for having the anal angle of the lower wings more or less produced into a tail.

Genus CORADES, Boisd. MSS.

Head of moderate width, hairy; maxillæ about two-thirds the length of the body, rather slender. Labial palpi porrect, ascending; longer than the head, clothed with hairs and scales, the scales at the back of the second joint forming a tuft before the apex. First joint short, subcylindric, curved, stoutest at the base. Second joint three times the length of the first, subcylindric, slightly curved at the base, incrassated towards the apex, which is truncate. Third joint slenderer than the second, about half its length, nearly cylindric, obtuse at the apex. Eyes nearly round, not very prominent, smooth. An-

tennæ less than two-thirds the length of the body, slender, grooved below, thickening gradually into a slender obtuse club.

Thorax moderately stout. Anterior wings subtriangular; the anterior margin slightly arched, the outer nearly straight, three-fifths the length of the anterior; inner margin nearly straight, four-fifths the length of the anterior. Costal nervule swollen at its origin, terminating beyond the middle of the anterior margin; subcostal nervure rather slender, throwing off its first nervule at a short distance before, its second immediately before the end of the cell, the third at a point about as far beyond the end of the cell as the origin of the first is before it, its fourth about as far beyond the third as the origin of this last is distant from the origin of the second. Fourth subcostal nervule terminating at the apex of the wing: upper disco-cellular nervule very short; middle and lower disco-cellular nervules about equal, the former curved inwards, the latter outwards; a rudimentary discoidal nervule extending inwards from the middle disco-cellular nervule: median nervure swollen at its base, its third nervule bent at a considerable angle where it is joined by the lower disco-cellular: submedian nervure stout, curved near the base: internal nervure wanting. Posterior wings obovate, produced into a short tail at the anal angle; the anterior margin nearly straight, the outer much curved; the abdominal fold ample. Precostal nervule stout, curved inwards: costal nervure rather stout, curved at its origin: subcostal nervure rather stout, bent at a considerable angle where the costal separates from it; its second nervule angular where the straight upper disco-cellular nervule anastomoses with it. Discoidal nervule extending into the cell: lower disco-cellular nervule straight, longer than the upper, anastomosing with the discoidal nervure a long way beyond the anastomosis of the upper disco-cellular. Third median nervule bent at nearly a right angle where the lower disco-cellular anastomoses with it. Anterior legs of the male slender, thinly clothed with scales and long delicate hairs; the femur rather shorter than the tibia; the tarsus little more than two-thirds the length of the tibia, one-jointed, nearly cylindric. Anterior legs of the female rather slender, clothed with scales and a few long fine hairs. Femur and tibia of about equal length, the latter nearly cylindric; the apex slightly stoutest, thinly spiny both within and without. Tarsus shorter than the tibia, five-jointed, the first joint more than twice the length of the rest combined; these all transverse: first to fourth bispinose at the apex; second and fifth with a tuft of hair on each side at the base. Middle and posterior feet with the femora rather stout; the tibiæ very spiny all round, their spurs stout; the tarsi densely spiny above, and, except the fifth joint, spiny below; the spines below arranged somewhat in two series, the first joint longer than the rest combined, second about one-third the length of the first, third three-fourths the length of the second, fourth rather more than half the length of the third, fifth not quite so long as the third. Claws curved, acute, grooved below; paronychialia bilacinate; the outer lacinia slender, pointed, not so long as the claw; the inner lancet-shaped, much broader than and nearly as long as the outer,

very hairy; pulvillus jointed, broad, not so long as the claws. Abdomen rather short, not robust.

This interesting genus, as remarked above, appears to be almost confined to the eastern slopes of the Andes and to the great branch of that mountain-range which runs along the northern parts of South America. Nearly all the specimens of the five or six species belonging to it existing in British collections were sent home by Mr. Bridges from the eastern parts of Bolivia, and by Mr. Dyson from Caraccas. The peculiar sexual scales on the disc of the anterior wings of the males resemble those of the males of most species of this family in being long, tapering to a delicate hair-like point, at the end of which is a little plumelet.

In form this genus resembles the *P. Actorion* of Linnæus, which is the type of the genus *Napho* of Boisduval, but that insect belongs to the preceding family of *Morphidæ*.

CORADES ENYO. *Cor. alis omnibus, supra, chocoladinis, anticarum apice obscuriore, fulvo-maculatâ; subtus, anticis fuscescentibus apice pallidiori, maculis tribus albidis notatâ, posticis fusco-gri-sescentibus, lineis duabus transversis obscurioribus.*

Exp. $2\frac{1}{2}$ unc. vel 65 mill. *Hab.* Caraccas.

Anterior wings, above chocolate-brown at the base, darker at the apex and along the outer margin; between the cell and the apex is a transverse band composed of three fulvous spots, the first of which is divided by the subcostal nervure; midway between the cell and the outer margin a curved spot of the same colour, divided by the first median nervule, and a rounded spot of the same colour near the anal angle. Posterior wings with the anal angle considerably produced into a tail, entirely chocolate-brown. Below, the anterior wings are fuscous, the base rather paler, the apex ashy; the subapical spots nearly white, the others as above; the posterior wings clouded and freckled with ashy-grey and fuscous, having a slight silvery reflection; a transverse band, commencing on the costa, crosses the middle of the cell, and terminates before it reaches the inner margin; a second similar band commences on the costa, and running along the lower disco-cellular nervule, terminates at the tail.

Head, thorax and abdomen fuscous above, the two latter greyish below; antennæ fuscous; palpi fuscous above, pale below.

This insect was taken by Mr. Dyson in the mountains of Caraccas, where it seems to be rather rare.

2. DESCRIPTION OF A NEW GENUS OF NOTODONTIDÆ.

By E. DOUBLEDAY, F.Z.S.

(*Annulosa*, pl. 5.)

Genus HYLÆORA.

Head small, densely clothed with long hair-like scales, those at the base of the antennæ very long, forming two tufts, which meet over the vertex. Eyes round, prominent. Maxillæ slender, short, scarcely so long as the thorax. Labial palpi short, the first and second joints densely scaly, the scales hair-like, the third joint clothed with short

scales : first joint much curved, broadest at the apex ; second joint one-half longer than the first, subcylindric, stoutest in the middle, truncate at the apex ; third joint small, oval, about one-third the length of the second joint. Antennæ of the male elongate, densely bipectinate, each pectination beautifully fringed with hairs : of the female long, setaceous, the inside set with short stiff hairs.

Thorax stout, crested, the crest much highest in front. Anterior wings elongate, the anterior margin but little curved until near the apex ; outer margin rather more than half the length of the anterior, slightly dentate ; inner margin nearly straight, rather longer than the outer. Costal nervure extending about three-fourths the length of the costa. First subcostal nervure thrown off beyond the middle of the cell, terminating not far from the extremity of the costal nervure ; second subcostal nervure thrown off shortly before the end of the cell, curved so as to cross the subcostal nervure at some distance beyond the end of the cell, terminating on the outer margin midway between the fifth subcostal and the first discoidal nervure ; third subcostal nervure arising rather nearer to the end of the cell than to the apex of the wing ; the fourth nearer to the third than to the apex, this nervure terminating at the apex. First discoidal nervure appearing at first sight to be a continuation of the subcostal nervure, the upper disco-cellular nervure being wanting. Lower about the same length as the middle disco-cellular nervure, united to the third median nervure shortly after its origin. Posterior wings with the anterior margin nearly straight, longer than the outer, which is rounded. Inner margin about two-thirds the length of the outer. Cell closed. Upper and lower disco-cellular nervure of about equal length. Discoidal nervure very slender ; the basal portion, as far as the end of the cell, atrophied. Legs with the femora and tibiæ densely hairy. The anterior tibiæ with a broad spur, nearly as long as the tibia itself, composed of a flat, slightly curved lancet-shaped lamina, fringed anteriorly. Tibiæ of the middle pair with two unequal spines at the apex, those of the third pair with two before the apex, two at the apex. Tarsi scaly, the first joint much the longest ; claws small, curved ; paronychial broad, very hairy, especially at the apex, shorter than the claw ; pulvillus jointed, the second joint very broad. Abdomen clothed with long hairs, elongate, longer in the male than in the female.

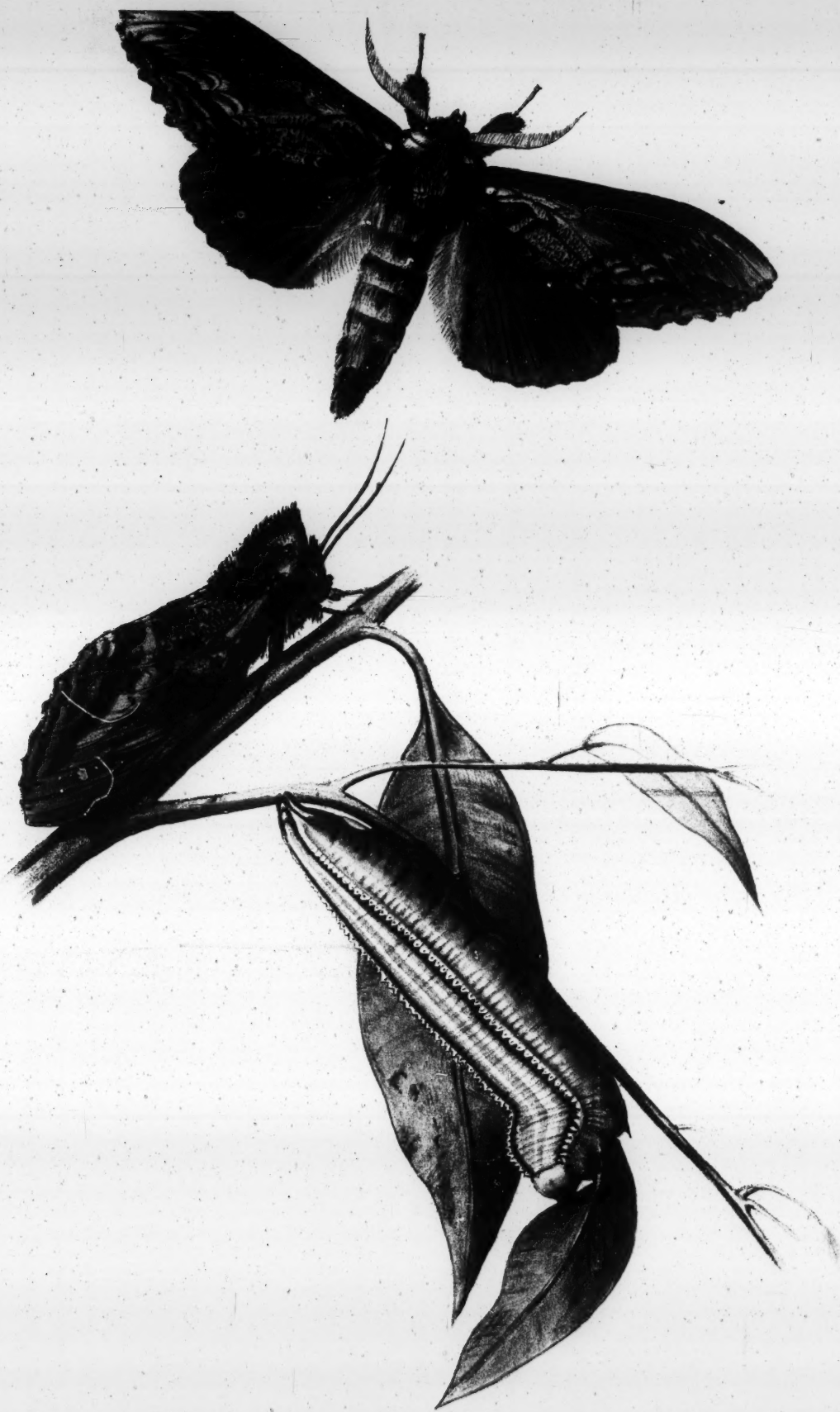
Larva stout, tapering towards the tail, the back flat, with a crenated ridge on each side.

HYLÆORA EUCALYPTI. *Hyl. alis anticis brunneis, nigro pallidoque variis, maculâ basali, alterâque geminatâ marginis anterioris, vittâ pone medium valdè angulatâ, fasciâque marginis exterioris fuscis ; posticis rufo-brunneis.*

Exp. alar. $3\frac{1}{2}$ unc. - $4\frac{1}{4}$ unc. vel 90-108 millim.

Hab. Australia.

I have not thought it necessary to enter into a detailed specific character of this insect, as the accompanying figure will give a far better idea of the species than the longest description. The noc-



W. Wing del et lith.

Hullmandel & Walton's New Process.

HYLEORA EUCALYPTI

tural Lepidoptera are often almost impossible to describe, and it is only by the most accurate figures, or by comparison of specimens, that we can arrive at the determination of species.

I am indebted to Mr. Alfred Lambert of Sydney for the specimens figured and for the drawing of the larva. The following note accompanies the specimen:—

"The larva is figured in drawing No. 2. When I first found it I concluded that it was a *Cerura*, as in its habits it resembles the larva of that genus. It forms a strong cocoon, which is slightly attached to the trunk of the tree just below the surface of the ground. In form this cocoon is much like that of our common *Saturnia*, only exteriorly it is covered with points of sticks, grass, &c. The larva feeds on the *Eucalypti*, is found in January; the imago appears in July."

From this it will be seen that it is a winter insect.

3. DESCRIPTION OF TWENTY-NINE NEW SPECIES OF HELICINA, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. *HELICINA ACUTA*, Pfr. *Hel. testâ depresso-conicâ, solidulâ, obliquè confertim striatâ et subgranulatâ, opacâ, luteâ, supernè rubro-unifasciatâ; spirâ conoideâ, acutâ, mucronatâ; anfractibus ferè 6 planiusculis, acutè carinatis, ultimo basi planiusculo; aperturâ perobliquâ, subtriangulârî; columellâ subverticali, brevissimâ, basi angulatâ, supernè in callum basalem tenuissimum abiente; peristomate simplice, aurantiaco, margine supero subrecto, basali subincrassato.*

Diam. 15, altit. $7\frac{1}{2}$ mill.

From Sibonga, isle of Zebu; collected by Mr. Cuming.

2. *HELICINA ADAMSIANA*, Pfr. *Hel. testâ depressâ, tenuiusculâ, sub lente seriebus confertis concentricis pustularum exiguarum subasperatâ, nitidulâ, diaphanâ, rubellâ; spirâ brevissimè conoideâ; anfractibus $5\frac{1}{2}$ planiusculis, ultimo depresso, peripheriâ rotundatâ, anticè non scrobiculatâ; aperturâ obliquâ, subtriangulârî; columellâ verticali, brevissimâ, basi subangulatâ, supernè in callum tenuem, circumscriptum dilatatâ; peristomate angulatim expanso, reflexiusculo, margine supero breviter soluto, stricto, basali prope columellam subdentatâ.*

Diam. 8, altit. $4\frac{1}{3}$ mill.

From Jamaica.

3. *HELICINA AMÆNA*, Pfr. *Hel. testâ subsemiglobosâ, solidiusculâ, obliquè striatulâ lineisque impressis concentricis distantibus sculptâ, nitidulâ, roseo et luteo vel albo variegatâ; spirâ convexâ, mucronulatâ; anfractibus $5\frac{1}{2}$ vix convexiusculis, ultimo infra medium carinato, basi subplano; aperturâ obliquâ, subtriangulârî, intus flavâ; columellâ brevi, verticaliter subrimatâ, basi angulosâ, retrorsum in callum tenuem, diffusum abiente; peristomate simplice, margine supero latè expanso, basali reflexo.*

Diam. 15, altit. $9\frac{1}{2}$ mill.

From Honduras.

4. *HELICINA BESCKEI*, Pfr. *Hel. testá subsemiglobosá, solidá, subtilissimè striatulá, sublævigatá, opacá, citriná unicolore vel fasciá 1 sanguineá juxta suturam ornatá, vel omnino rubicundá; spirá brevi, convexo-conoideá, submucronatá; anfractibus 5 subplanis, ultimo ad peripheriam cariná 1 acutá, pluribusque obtusioribus munito; aperturá obliquá, subtriangulári; columellá breviter recedente, basi obsolete angulatá; peristomate expanso, subincrassato, margine supero strictiusculo, basali subarcuato; callo basali tenuissimo.*

Diam. 17, altit. 10 mill.

From Brazil (Bescke).

5. *HELICINA CAMPANULA*, Pfr. *Hel. testá campanulato-conicá, solidulá, lævigatá, nitidá, citriná; spirá elevatá, convexá, acuminatá; anfractibus 6 planiusculis, ultimo pone aperturam subconstricto, basi planulato; aperturá obliquá, semilunari-subtriangulári; columellá breviter recedente, basi subtruncatá, callum nitidum, semicircularem emittente; peristomate simplice, tenui, breviter expanso, margine basali strictiusculo.*

Diam. $8\frac{1}{3}$, altit. 7 mill.

From the island of Cuba.

6. *HELICINA CONCENTRICA*, Pfr. *Hel. testá depressè trochiformi, tenuiusculá, striis longitudinalibus et obliquis sub lente subtilissimè sculptá, lineis concentricis elevatis utrinque munitá, acutè carinatá, nitidulá, carneo-fusculá, albido variegatá; spirá conoideá, subpapillatá; anfractibus $4\frac{1}{2}$ vix convexiusculis, ultimo utrinque convexiore; aperturá obliquá, subsecuriformi, latiore quam altá; columellá subrimatá, breviter arcuatá, basi incrassatá in callum album subcircumscriptionem retrorsum dilatatá; peristomate simplice, breviter expanso, margine basali immediatè in columellam continuato.*

Diam. 10, altit. vix 6 mill.

From Venezuela and New Granada (De Lattre); a larger variety from Mirador, Mexico (Galeotti).

7. *HELICINA CONSTRICTA*, Pfr. *Hel. testá parvâ, lenticulari, crassâ, sublævigatâ, non nitidâ, opacâ, albidâ, lineis undulatis rubris pictâ; spirâ vix elevatâ, obtusâ; anfractibus $4\frac{1}{2}$ planulatis, ultimo angulato, basi suburgido, pone aperturam constricto; aperturá obliquâ, subtriangulári, intus rubrâ; columellá simplice, callum crassiusculum albidum vel igneum retrorsum emittente; peristomate simplice, obtuso, latere dextro rotundato.*

Diam. 6, altit. $3\frac{1}{2}$ mill.

From Otaheite and the Sandwich Islands.

8. *HELICINA CONVEXA*, Pfr. *Hel. testá convexo-orbiculatâ, solidâ, lævigatâ, nitidâ, albâ; spirâ fornicatâ, mucronulatâ; anfractibus $4\frac{1}{2}$, ultimis 2 convexiusculis, ultimo obsolete angulato; aperturá integrâ, obliquâ, semilunari; columellá breviter arcuatâ, retrorsum in callum crassum, concolorem abiente; peristomate incrassato, breviter expanso, margine basali à callo columellari incisurâ levissimâ separato.*

Diam. $6\frac{1}{2}$, altit. $4\frac{1}{2}$ mill.

Locality unknown.

9. *HELICINA CUMINGIANA*, Pfr. *Hel. testá subglobosá, tenuiusculá, longitudinaliter et confertim plicatulá, carneá, rubro punctatá et variegatá; spirá brevi, conoideá, obtusiusculá; anfractibus $5\frac{1}{2}$ planiusculis, ultimo inflato, obsolete angulato; aperturá subverticali, semiovali; columellá basi dilatátá, antrorsum arcuatá, subtruncatá, retrorsum in callum basi crassum, supernè diffusum abiente; peristomate subincrassato, breviter expanso, albo.*

Diam. 21, altit. $16\frac{1}{2}$ mill.

Locality unknown.

10. *HELICINA DYSONI*, Pfr. *Hel. testá orbiculato-conoideá, solidiusculá, striatulá, nitidulá, carneá, supernè fasciis 2 angustis, saturatoribus ornatá; spirá elatá, obtusiusculá; anfractibus 5 convexiusculis, lente accrescentibus, ultimo basi subplanato; aperturá obliquá, semiovali, altiore quam latá; columellá brevi, basi subtruncatá, callum albidum, lineá subimpressá circumscriptum emitte; peristomate simplice, brevissimè reflexiusculo, margine utroque leviter arcuato.*

Diam. 8, altit. $5\frac{1}{2}$ mill.

β . *Minor, testá saturatè carneá, supernè fasciis 2 angustis rubris et ad peripheriam 1 albá.*

γ . *Testá fulvo-rubellá, supernè fasciis 2 angustis saturatoribus.*

δ . *Minor, testá flavá, supernè fasciis 2 angustis fulvis, ad peripheriam 1 albidá ornatá.*

From Cumana, Honduras (Dyson).

11. *HELICINA EXIGUA*, Pfr. *Hel. testá minutissimá, conicá, tenui, subtilissimè punctato-striatulá, pellucidá, pallidè carneá; spirá conicá, obtusiusculá; anfractibus 5 perconvexis, ultimo obsolete angulato, basi planiusculo; aperturá obliquá, lunari; columellá breviter recedente, callum exiguum emittente; peristomate simplice, tenui.*

Diam. $2\frac{1}{2}$, altit. 2 mill.

From Honduras (Dyson).

12. *HELICINA FUNCKI*, Pfr. *Hel. testá conico-subglobosá, tenuiusculá, sub lente tenuissimè obliquè striatulá, vix nitidulá, flavidá, roseo-nebulosá; spirá conoideá, obtusiusculá; anfractibus $5\frac{1}{2}$ planiusculis, ultimo utrinque convexiore, obsolete angulato; aperturá obliquá, semiovali; columellá subarcuatá, lined impressá verticali notatá, basi subnodosá, in callum sensim tenuiorem retrorsum abiente; peristomate latè expanso, margine supero subrepano.*

Diam. $13\frac{1}{2}$, altit. 9 mill.

From San Yago, New Granada (Funck).

13. *HELICINA GONCHILA*, Pfr. *Hel. testá conoideo-subglobosá, tenuiusculá, supernè striis spiralibus obsolete sculptá et punctatá, nitidulá, fulvo-carneá; spirá brevi, conoideá, subacutá; anfrac-*

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tibus $4\frac{1}{2}$ vix convexiusculis, ultimo medio subcarinato, luteo-cingulato, basi convexiore, distinctius concentricè striato; aperturà subobliquà, triangulàri-semiovali, altiore quam latà; columellà subrecedente, supernè lineam impressam, brevem, curvatam emittente, basi acutè dentatà; peristomate albo, rectangulè latè patente, margine basali substricto, cum columellà angulum acutiusculum formante.

Diam. 10, altit. $6\frac{1}{2}$ mill.

From Venezuela.

14. *HELICINA GOSSEI*, Pfr. *Hel. testà depresso-globosà, solidà, pustulis seriatis subasperatà, nitidulà, fuscidulo-rubrà; spirà convexà; anfractibus $4\frac{1}{2}$ parum convexis, ultimo rotundato; aperturà triangulàri-semiovali, intus carnea, nitidà; columellà basi truncatà, retrorsum in callum crassum carneum abiente; peristomate subincrassato, expanso, juxta columellam vix emarginato.*

Diam. 19, altit. $13\frac{1}{2}$ mill.

From Jamaica (Gosse).

15. *HELICINA GUILDINGIANA*, Pfr. *Hel. testà depressà, tenuiusculà, sub lente subtilissimè granulatà, diaphanà, straminea vel albidà, infra suturam fulvo-unifasciatà; spirà brevi, convexà; anfractibus 4 vix convexiusculis, ultimo subdepresso, basi vix convexiore; aperturà obliquà, subtriangulàri-semiovali; columellà brevi, excavatà, antrorsum in denticulum desinente, retrorsum in callum tenuem, semicircularem, flavescentem expansà; peristomate tenui, breviter reflexo, margine supero repando, basali incisurà levi à columellà separato.*

Diam. 8, altit. $4\frac{1}{2}$ mill.

Locality unknown.

16. *HELICINA HANLEYANA*, Pfr. *Hel. testà globoso-conicà, solidà, lineis concentricis, impressis, subdistantibus sculptà, vix diaphana, nitidà, fulvo-carnea; spirà breviter conoidèa, obtusiusculà; anfractibus 5 vix convexiusculis, ultimo rotundato, anticè subdescendente; aperturà parum obliquà, subsemicirculari; columellà brevissimà, extrorsum denticulatà, callum tenuem, albidum, diffusum emittente; peristomate albo, vix expansiusculo, intus subincrassato, basi in denticulum columellæ abiente.*

Diam. $7\frac{1}{2}$, altit. $5\frac{1}{3}$ mill.

From New Orleans (Mr. Salle).

17. *HELICINA KIENERI*, Pfr. *Hel. testà conoidèa, tenuiusculà, obliquè striatà, lineis concentricis confertis subtilissimè decussatà, albidà, fusco-violaceo marmoratà; spirà convexo-conoidèa, acutà; anfractibus $5\frac{1}{2}$ vix convexiusculis, ultimo compressè carinato, basi convexiore; columellà recedente, planatà, supernè impressà, basi incrassatà in callum basalem tenuem abiente; aperturà obliquà, integrà, semiovali, altiore quam latà; peristomate simplice, tenui, latè expanso.*

Diam. 16, altit. $11\frac{1}{2}$ mill.

Locality unknown.

18. *HELICINA LINDENI*, Pfr. *Hel. testâ globoso-conicâ, tenuiusculâ, subtilissimè striolatâ et punctatâ, subdiaphanâ, pallidè stramineâ vel carnèâ; spirâ conicâ, acutiusculâ; anfractibus 6 vix convexiusculis, ultimo inflato, obsoletè angulato; aperturâ integrâ, parum obliquâ, semiovali, altiore quàm latâ; columellâ leviter arcuatâ, extrorsum in denticulum desinente, callum emittente exiguum, tenuem; peristomate breviter expanso, reflexiusculo.*

Diam. $11\frac{1}{2}$, altit. $8\frac{1}{3}$ mill.

From Tapinaba, Mexico (Linden).

19. *HELICINA ORBIGNYI*, Pfr. *Hel. testâ depressâ, sublenticulari, solidâ, striatâ, vix nitidâ, fusco-carnèâ; spirâ vix elatâ; anfractibus $4\frac{1}{2}$ planiusculis, ultimo depresso, subangulato; aperturâ obliquâ, semiovali, altiore quàm latâ; columellâ brevi, basi antrorsum dentatâ, callum albidum, semicircularem retrorsum emittente; peristomate recto, subincrassato, juxta dentem columellæ non emarginato.*

Diam. $7\frac{1}{3}$, altit. 4 mill.

From the island of Cuba.

20. *HELICINA OWENIANA*, Pfr. *Hel. testâ conicâ, tenui, lævigatâ, sub lente lineolis impressis, antrorsum obliquis subtilissimè sculptâ, nitidâ, pellucidâ, stramineâ, sursum saturatiore; spirâ conicâ, vertice obtusiusculo, castaneo; suturâ lineari, albo-marginatâ; anfractibus 6 planis, ultimo basi planiusculo; aperturâ subobliquâ, semiovali; columellâ brevi, verticaliter rimatâ, callum tenuissimum retrorsum emittente; peristomate aurantiaco, angulatim patente, reflexiusculo, margine utroque levissimè curvato.*

Diam. 9, altit. $7\frac{1}{2}$ mill.

From Chiapas, Mexico (Ghiesbreght).

21. *HELICINA PLICATULA*, Pfr. *Hel. testâ depressè conoideâ, solidâ, obliquè regulariter et elegantissimè plicatâ, nitidâ, cornèâ; spirâ brevi, conoideâ, acutiusculâ; anfractibus ferè 5 convexiusculis, ultimo supernè impresso, peripheriâ obsoletissimè angulato; aperturâ obliquâ, semilunari; columellâ brevissimâ, simplice, in callum tenuissimum diffusâ; peristomate subincrassato, carneo, margine supero sinuato, basali juxta columellam subdentato.*

Diam. 5, altit. 3 mill.

From the island of Martinique.

22. *HELICINA REEVEANA*, Pfr. *Hel. testâ conicâ, solidâ, striis incrementi distinctis et lineolis obliquis impressis confertissimis sub lente clathratâ, nitidâ, albidâ, rufo nebulosâ et tæniatâ; spirâ elevatâ, acutiusculâ; suturâ impressâ; anfractibus 6 convexiusculis, ultimo angulato, basi vix convexiore; aperturâ subsemiovali, intus castaneâ; columellâ brevissimâ, horizontaliter in callum parvulum, album, expansâ; peristomate albo, angulatim patente, margine basali leviter arcuato, cum columellâ extus subangulatim juncto.*

Diam. $8\frac{1}{2}$, altit. 6 mill.

From Cuba.

23. *HELICINA ROHRI*, Pfr. *Hel. testá conoïded, crassá, striatuld et submalleatá, opacá, vix nitiduld, stramineo-albidá vel purpureá, albo-fasciatá; spirá conoïded, acutiusculá; anfractibus $4\frac{1}{2}$ —5 planiusculis, ultimo supernè turgido, ad peripheriam cariná acutá, compressá, prominente munito, anticè deflexo, basi vix convexo; aperturá obliquá, parvuld, semiovali, altiore quam latá; columellá subsimplice, basi obsoletè tuberculatá, callum semicircularem album retrorsum emittente; peristomate recto, acuto, intus crassè albo-labiato, margine supero emarginato.*

Diam. 10, altit. 7 mill.

From the Marquesas Islands (Rohr).

24. *HELICINA SANGUINEA*, Pfr. *Hel. testá conoïdeo-orbiculatá, crassá, punctato-striatuld, opacá, sanguined; spirá brevi, conoïded, acutiusculá; anfractibus $4\frac{1}{2}$ planis, ultimo utrinque convexiusculo, medio subangulato; aperturá obliquá, subtriangulari, altiore quam latá; columellá basi antrorsum dentatá, callum tenuem, semicircularem retrorsum emittente; peristomate recto, intus sublabiato, margine basali strictiusculo.*

Diam. $10\frac{1}{2}$, altit. 6 mill.

Locality unknown.

25. *HELICINA (TROCHATELLA) SEMILIRATA*, Pfr. *Hel. testá conico-globosá, solidá, opacá, flavidá, supernè confertim albo-liratá; spirá conicá, acutiusculá; anfractibus $5\frac{1}{2}$ planiusculis, ultimo convexiusculo, carinato, basi subtilissimè concentricè striato; aperturá perobliquá, subtriangulari; columellá simplice, immediatè in marginem basalem abiente; peristomate incrassato, angulatim expanso, marginibus callo tenuissimo junctis, supero sinuato.*

Diam. $10\frac{1}{2}$, altit. $7\frac{1}{2}$ mill.

From Venezuela (Linden).

26. *HELICINA SOWERBIANA*, Pfr. *Hel. testá depressè trochiformi, tenuiusculá, lineis impressis spiraliter sulcatá, albá; spirá conicá, acutiusculá; anfractibus 6 planiusculis, ultimo subcarinato, basi convexiusculo; aperturá parum obliquá, subtriangulari; columellá tenui, basi nodiferá; peristomate simplice, angulatim expanso, margine supero sinuato; callo basali tenuissimo.*

Diam. 21, altit. 14 mill.

From Guatemala (De Lattre).

27. *HELICINA TENUILABRIS*, Pfr. *Hel. testá subglobosá, solidiusculá, sublævigatá, albo et cinnamomeo variegatá et subfasciatá; spirá breviter conoïded, acutiusculá; anfractibus ferè 5 planiusculis, ultimo utrinque convexo, anticè vix descendente; aperturá obliquá, semiovali, intus cerasiná, pallido-fasciatá; columellá recedente, angustá, retrorsum in callum tenuem dilatatá, basi immediatè in peristoma tenue, expansiusculum, abiente.*

Diam. 10, altit. 7 mill.

Locality unknown.

28. *HELICINA TENUIS*, Pfr. *Hel. testá turbinatá, tenuissimá, vix*



Printed by Hullmandel & Walton.

PSITTACUS RÜPPELLII.

striatula, pellucida, corneo-albida, rubro obsolete trifasciata; spirula conica, acuta; anfractibus 6 vix convexiusculis, ultimo basi planiusculo; apertura ferè verticali, triangulari-semiovali; columella brevi, basi retrorsum subdentata, supernè in callum nitidum, circumscriptum, dilatata; peristomate tenui, angulatum expanso, margine basali cum columellæ basi angulum formante.

Diam. 11, altit. $8\frac{1}{2}$ mill.

From Yucatan.

29. *HELICINA UNIDENTATA*, Pfr. *Hel. testâ depressâ, tenuiusculâ, liris concentricis alternè im validis, obtusis et minoribus cinctâ, diaphanâ, nitidulâ, rubellâ; spirula vix elevatâ; anfractibus $4\frac{1}{2}$ depressis, ultimo anticè descendente, basi medio profundè excavato; apertura perobliquâ, latè lunari; columellâ simplice, retrorsum in callum albidum circumscriptum dilatata; peristomate expanso, intus albo-labiato, margine basali prope columellam dente magno, prominente, instructo.*

Diam. 5, altit. $2\frac{1}{2}$ mill.

From Honduras (Dyson).

4. DESCRIPTION OF A NEW SPECIES OF PARROT.

By G. R. GRAY, Esq., F.L.S. ETC.

(Aves, pl. 5.)

PSITTACUS RÜPPELLII.

Uniform dark bronze colour, with the lesser and under wing-coverts bright yellow; the feathers of the thighs orange-yellow.

Total length 9 inches 6 lines; bill, from gape, 10 lines; wings 5 inches 6 lines; tail 3 inches 3 lines; tarsi 6 lines.

The greater uniformity of colour at once distinguishes it from the allied species, *Psittacus Meyeri* and *P. rufiventris* of Dr. Rüppell.

The specimen from which this description is taken lived for upwards of twelve months in the Society's collection, and is believed to have been brought to this country from the river Nunez. I have named it in honour of my distinguished friend, whose labours have contributed so largely to our knowledge of African zoology.

The Meeting was adjourned by the Chairman until Tuesday, November 14th.

November 14, 1848.

William Yarrell, Esq., Vice-President, in the Chair.

The following papers were read:—

1. NOTES ON THE ANATOMY OF THE MALE AUROCHS (*Bison europæus*).
BY PROF. OWEN, F.R.S., F.Z.S. ETC. ETC.

It was with much concern that I received notice at the latter part of September last of the sudden failing of health of the male Aurochs; the male of the pair munificently presented to the Zoological Society by His Imperial Majesty the Emperor of Russia, at the instance of our distinguished scientific countryman Sir Roderick Impey Murchison, G.C.SS. The animal had refused its food; it was prostrated by impeded and frequent respiration and a general oppressive feverish state, and died about a week after the first attack.

The morbid appearances, on dissection, were simple and conclusive. The whole right lung had been the seat of active inflammation and congestion; most of the air-cells were filled with a bloody serum, which was infiltrated throughout the connecting tissue. A mass of coagulable lymph had been exuded from the whole exterior surface of the organ, cementing its lobes to each other and to the surrounding parts, especially the pericardium. The mucous lining of the bronchial tubes was of a deep livid red colour, and the same evidence of inflammation extended throughout the trachea, and a little way down the bronchi of the sound lung. Both the liver and spleen broke down more easily under pressure than in the healthy common Ox; the texture of the kidney also was softer, and of a more fuscous colour. The vessels of the pia mater were unusually gorged; but these were probably the secondary consequences of the influence upon the circulation, and the quality of the blood induced by the primary and active disorganization of the respiratory system. The exciting cause of the disease I take to be the influence of the raw cold and heavy fogs, consequent on the undrained extent of clay-ground in which the menagerie of the Society is placed, and by which it is extensively surrounded. The effects of an atmosphere so loaded on the mucous tract of the respiratory organs to which it is applied, has long been manifested in various species of the exotic animals attempted to be preserved in the Zoological Gardens; and the records of medicine bear testimony to similar ill effects upon those human inhabitants of the Regent's Park, whose habits and strength of constitution do not enable them to control and overcome this pregnant but happily remediable source of ill-health.

The male Aurochs, at the period of its death, was two years and five months old. The following was the state of its dentition:—
 $i\ 3-3, c\ 1-1, m\ \frac{5-5}{5-5} = 28$; of which $i\ 1$ was permanent, $i\ 2, i\ 3,$

and *c* were deciduous; the molars were *d* 2, 3 and 4, *m* 1 and 2. I here use the formula explained in my communication to the British Association at Swansea, the notation used conveying in the space of one line the following facts: viz. that the animal had shed and replaced the median incisors of the lower jaw, but retained all the rest of its deciduous dentition, having gained in addition the first and second true molars of the permanent series.

The tongue presented that deep leaden-bluish colour which Gilbert describes*, but is rough, as in the common Ox, and the inner surface of the sides of the mouth is beset with the same kind of papillæ. The scrotum and testes were much smaller than in the young domestic Bull of the same age: the scrotum is rugous, sessile, not pendulous with a constricted neck, as in the *Bos Taurus*.

As in most Ruminants, the principal viscus which presents itself on opening the abdomen, is the capacious paunch covered by the great omental sac: besides the paunch, some of the small intestines appeared in the right iliac and in the pubic regions.

The paunch is firmly supported by its attachments on the dorsal aspect to the crura of the diaphragm and part of the expanded concavity of that muscle. The part of the serous membrane which answers to the aperture or mouth of the great omental sac in Man is attached to the upper and fore-part of the paunch, not to the lower or greater curvature, so that a free fold of the omentum is spread over the paunch between it and the abdominal muscles: the posterior fold of the omentum is attached to the left side or contour of the paunch, whence it is continued upon the fourth cavity, the duodenum and pancreas, and so on to the right crus of the diaphragm, forming one of the strong suspensory ligaments: the left lumbar attachment is continued more immediately from the long intra-abdominal œsophagus and back part of the paunch and reticulum.

The paunch is sub-bifid, or divided into two principal chambers. The villi of its inner surface are intermediate in character between those of the common Ox and those of the American Bison. The villi of the rumen of the Ox are comparatively large, coarse, flattened, but pointed, except near the reticulum, where they assume the form of laminae with irregular jagged margins. In the American Bison they are longer, and for the most part filiform, and consequently more numerous. In the Aurochs the villi are shorter than in the Bison, and broader, being compressed and clavate, terminating in an even rounded margin: they are smaller and more numerous than in the common Ox. The relative position, size, and mode of intercommunication of the four divisions of the ruminating stomach offer no noticeable differences from that of the common Ox: but the disposition of the lining membrane of the second cavity (reticulum or honeycomb-bag) offers as marked a difference as that noticed on the inner surface of the paunch. In the common Ox the cells of the reticulum are deeper than in any Ruminant excepting the Camel-tribe, and they are of two kinds in respect of their size: the larger

* Gilbert, *Indagatores Naturæ in Lituania, De Bisonte Lituanico*, pp. 30—49; Vilnæ, 1781.

cells are disposed between broad parallel septa, and are formed by narrower septa at right angles to these: the smaller cells are subdivisions of the larger or primary cells.

In the Bison only one kind of hexagonal cells can properly be recognized, and their walls are of equal depth as a general rule: the folds developed from the bottom of these cells are much narrower, shorter, and more irregular than those that mark out the secondary cells in the common Ox. The laminae of the third cavity (*psalterium*) are of two kinds, large and small; the larger kind presenting two sizes which alternate with one another; but between each of the broader or larger kind of laminae one of the smaller kind intervenes: their surfaces are papillose, but the papillae are shorter than in the common Ox, which presents a similar arrangement of the laminae. A thick epithelium lines the whole of the three cavities above-described, as in other Ruminants. The lining membrane of the fourth or true digesting cavity was rather more vascular than usual: the almost smooth mucous membrane is produced into subparallel oblique folds $1\frac{1}{2}$ inch in breadth at its cardiac half: these subside towards the pyloric half, where the chief object is the valvular protuberance which overhangs the aperture leading into the duodenum. The duodenum bends backwards and turns down abruptly before gaining the left lumbar region; then bends upwards and towards the left side, where it becomes free and carries out a complete investment from the mesentery: in the previous part of its course it is closely attached to the adjoining intestines. The principal mass of the small intestines lies dorsal and sacral of the enormous stomach, disposed in short coils upon the mesentery; they measured 132 feet in length.

The ilium terminates in the cæcum in the right lumbar region. The cæcum is a simple, cylindrical, non-sacculated gut, about twice the diameter of the ilium; it is bent upon the beginning of the colon, to which it is attached.

The colon describes an arch at its commencement, ascending from the right side, and curving over to the left behind the paunch, then winding to the right again, and describing the series of subspiral folds characteristic of this gut in the Ruminants. The rectum descends nearly along the bodies of the lumbar and sacral vertebrae to the anus. The total length of the large intestines was twenty-one feet. The liver was proportionally small, and consisted chiefly of one lobe, as in other Ruminants; not extending into the left epigastrium. There is a small *lobulus Spigelii* on the right and posterior border.

The gall-bladder, large and full, protruded from a fissure in the right side of the liver: its duct receives four or five tributary ducts before it unites with the proper hepatic duct, which brings the bile from the left part of the liver. The *ductus communis choledochus* enters the duodenum where it forms its first bend.

The pancreas lies below the liver, with its larger end across the last dorsal vertebra, and its narrower prolongation accompanying the duodenum; the duct terminates in that intestine about eight inches beyond the biliary inlet. The kidneys consisted each of about twenty

distinct lobes or renules. The more compact suprarenal bodies also manifested a subdivided outer surface.

The above portions of the notes of the dissection of the male Aurochs include all that appeared to be in any degree characteristic of the species, or affording any discriminative characters, as compared with its nearest congeners. The thoracic viscera, as far as their morbid condition permitted the comparison, were like those of the common Ox. I do not remember to have been so much impressed in former dissections of Ruminants with the beautiful adaptation of the parts exterior to the large and complex stomach, to its support and the facilitating its movements. Much of what is ordinary inelastic aponeurotic tissue in the abdominal parietes of many other quadrupeds, *e. g.* the larger Carnivora, is metamorphosed into the yellow elastic tissue—*tissu jaune*—in the Aurochs, as in the common Ox, and in a still greater degree in the Rhinoceros and Elephant. By this change the abdominal muscles are proportionally relieved or aided in the sustentation of the capacious and heavily-laden digestive reservoirs.

In the Aurochs, as in the other Ruminants, the disposition of the omental sac upon the sternal aspect of the paunch, interposed between it and the abdominal walls, makes it perform the office of a serous articular sac, two smooth and lubricated surfaces—the inner ones of the sac—being apposed to each other, and easily and freely gliding on each other; it is like a kind of great 'tunica vaginalis'—facilitating the spiral peristaltic movements of the paunch, and by the layer of fat tending to preserve the warmth of the paunch.

The skeleton of the Aurochs has been well delineated by Bojanus, in connection with an outline of the entire animal, and by Mr. George Landseer separately. The general characters of the framework of this rare species are very accurately rendered in both these figures. The skeleton of the young male Aurochs showed the same characteristic elevation of the spinous processes of the anterior dorsal vertebræ, and the same characteristic number of ribs—fourteen pairs—which are shown in the above-cited figures, and which repeated examination has established as constant peculiarities of the species. With regard to the lengthened spines, I shall only remark on this interesting morphological peculiarity, that it contributes to illustrate the artificial nature of that view of the part commonly called rib, or vertebral rib, as a bone or element of the skeleton, apart from or belonging to a distinct genus from the other vertebral elements. This view originally arose from the contemplation of the proportions of the ribs or pleurapophyses and spinous processes as they exist in Man. A long and slender form is associated with the idea of a rib as an essential character. In the Aurochs we see that the vertebral element called neural spine is longer than the pleurapophysis in the second and third dorsal vertebræ. But it is ankylosed to the other vertebral elements, whilst the pleurapophyses retain their primitive freedom, and the dorsal vertebræ are characterized as 'articulating with the ribs.' This, however, is a periodic, not an essential character. At an early period of life the cervical vertebræ also articulate with

ribs, *i. e.* pleurapophyses; but these become broad and remain short, and coalesce with the centrums and diapophyses of their respective vertebræ; and the anthropotomist then calls them 'transverse processes,' and distinguishes them as being perforated, the foramen being the space included between the centrum, the diapophysis, and the pleurapophysis.

Another remark is suggested by the skeleton of the Aurochs, touching the true value of the character of its fourteenth pair of free pleurapophyses. In the genus *Bos* proper there are only thirteen pairs. In the American Bison there are *fifteen* pairs. According to the artificial character in anatomy of the 'dorsal vertebræ,' the above-cited *Bovidae* have been supposed to differ actually in the number of their vertebræ, whereas this is absolutely the same in each of them; after the seven cervical vertebræ there are nineteen true vertebræ, *i. e.* nineteen vertebræ between the last cervical and the sacral vertebræ. In the embryos of many Ungulates, rudiments of ribs (pleurapophyses) are found moveably attached to vertebræ, to which they afterwards become anchylosed, and accordingly are called lumbar vertebræ. In the Aurochs these elements retain their freedom and growth in one more vertebra than in the common Ox; in the Bison two more vertebræ have moveable pleurapophyses. Accordingly we find that if the common Ox has but thirteen dorsal vertebræ, it has six lumbar vertebræ; if the Aurochs has fourteen dorsal, it has five lumbar; and if the Bison has fifteen dorsal vertebræ, it has but four lumbar. But the unity of the numerical character of the true vertebræ does not stop here; for when we find, *e. g.* in the Dromedary, the Camel, the Llama, and the Vicugna, only twelve dorsal vertebræ, the typical nineteen is completed by seven lumbar vertebræ; and this number is never surpassed in the Ruminants. Most of the species agree with the common Ox in the number of the true vertebræ that retain their pleurapophyses in moveable connection. The Reindeer and the Giraffe resemble the Aurochs in having fourteen dorsal vertebræ. But what perhaps is still more interesting and usefully instructive as to the true affinities of the hoofed quadrupeds with toes in even number, is the fact, that besides their common possession of a complex stomach and simple cæcum, of a peculiar form of astragalus, of a femur with two trochanters, and of a symmetrical pattern of the grinding surface of the molar teeth, they also agree, as I have shown in my paper on the genus *Hyopotamus*, in having nineteen natural segments of the skeleton, neither more nor less, between the neck and the pelvis. The Babiroussa, the African Wart-hogs (*Phacochærus*), and the extinct *Anoplotherium*, resemble the majority of Ruminants in having thirteen dorsals and six lumbar; the Wild Boar and the Peccari resemble the Aurochs in having fourteen dorsals and five lumbar; the Hippopotamus resembles the Bison in having fifteen dorsals and four lumbar.

This constancy in the number of the true vertebræ in the Artiodactyle Ungulates is the more remarkable, and demonstrative of their natural co-affinity, by contrast with the variable number of those vertebræ in the odd-toed or Perissodactyle group, in which we find

twenty-two dorso-lumbar vertebræ in the Rhinoceros, twenty-three in the Tapir and Palæotherium, and as many as twenty-nine in the little Hyrax.

With regard to the vertebræ of the trunk of the Aurochs, I may remark, that the only accessory process in addition to the ordinary zygapophyses and diapophyses is the metapophysis, which appears as a stout tubercle above the diapophysis in the middle dorsals, and gradually advances and rises upon the anterior zygapophyses in the posterior dorsal and lumbar vertebræ. This process is developed to an equality of length with the spinous processes in the Armadillos. It is commonly associated with another accessory exogenous process, to which I have given the name 'anapophysis' in the Catalogue of the Osteological Series in the Royal College of Surgeons. This process, which in most of the Rodentia rises, at first, in common with the metapophysis, as a tubercle above the diapophysis, separates from the metapophysis as the vertebræ approach the pelvis, and in the lumbar series the anapophysis is seen projecting backwards from the base, or a little above the base of the diapophysis, its office being usually that of underlapping the anterior zygapophysis of the succeeding vertebræ, and strengthening the articulation, whence Cuvier has alluded to it as an accessory articular process; but its relation to the zygapophysial joint is an occasional and not a constant character. The tenth dorsal vertebra of the Saw-toothed Seal, *Stenorhynchus serridens*, affords a good example of well-developed metapophyses; they are also large in most of the trunk vertebræ of the Tapir. The anapophyses are well-developed in the anterior lumbar vertebræ of the Hare and Rabbit.

I have been induced to make this digression at the request of some of my anatomical friends, who have desired me to publish definitions of the terms, or rather of the processes so termed.

Returning to the Aurochs, I shall conclude with some remarks, which the opportunity of dissecting the recent animal enables me to offer, respecting the true structure of the bones of the fore-foot (fig. 1) and hind-foot (fig. 2).

The carpus (fig. 1) consists, as in other Ruminants, of six bones, four in the proximal row, viz. scaphoides (*s*), lunare (*l*), cuneiforme (*c*), pisiforme (*p*); and two in the second row, the magnum (*m*) and the unciforme (*u*).

The os magnum supports that half of the cannon-bone which answers to the metacarpal of the digitus medius (III). The unciforme supports the other moiety which answers to the metacarpus of the digitus annularis (IV). The rudiment of the proximal end of the metacarpus of the digitus index (II) articulates with a part of the os magnum, which may therefore be regarded as a connate trapezoides. The rudiment of the proximal end of the metacarpal of the digitus minimus (V) articulates with the cuneiforme, and is applied to the ulnar end of the unciforme.

The distal rudiments of the two abortive digits (II) and (V) are represented by a middle phalanx (2) and ungual phalanx (3), supported by fasciæ extending from the proximal rudiments of their metacarpals,

and also by ligaments attaching them to the large trochlear sesamoids behind the metacarpo-phalangeal joints of the two normal digits (III and IV). These have each three phalanges (1, 2, 3) forming almost symmetrical pairs, with a large sesamoid (*s*) behind the distal joint.

The hind-feet (fig. 2) are longer and more slender than the fore-feet, the greater length being chiefly due to the coalesced metatarsals.

The tarsus includes five bones; it seems to consist of six, but the ossicle (67) wedged between the tibia (66), calcaneum (*cl*), and astragalus (*a*), is the distal epiphysis of the fibula, and the sole representative of that bone. The astragalus and calcaneum conform to the ordinary Ruminant type; according to which, also, the naviculare (*s*) and cuboid (*b*) are confluent. The ectocuneiform (*ce*) is a broad flat bone supporting the moiety of the cannon-bone which answers to the digitus medius (*iii*); a small round sesamoid (*s*) at the back of this joint has not sufficiently distinctive characters to carry conviction as to its special homology. The outer half of the cannon-bone, or metatarsal of the fourth toe (*iv*), articulates with the cuboid part of the scapho-cuboid bone. The second digit (*ii*) and fifth digit (*v*) are represented solely by the rudiments of their middle and ungual phalanges (2 & 3). There are two large trochlear sesamoids (*s*) behind the metatarso-phalangeal joints of the two fully-developed

Fig. 1.

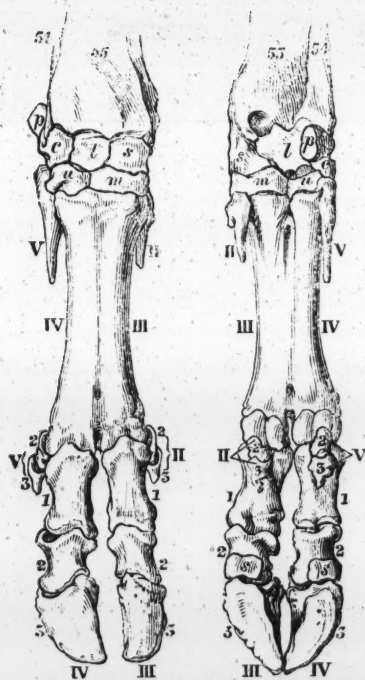
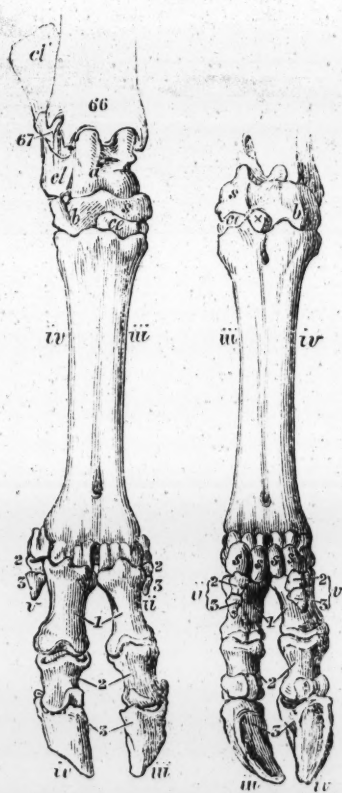
Bones of fore-foot (*Bison europæus*).

Fig. 2.

Bones of hind-foot (*Bison europæus*).

toes (*iii* & *iv*), and one sesamoid behind the last joint of the same toes.

In most artificially-prepared skeletons of Ruminants, more or less of the small bones, often regarded as accessory, are lost; but they are really for the most part beautifully indicative of traces of adherence to the archetype, and I have on that account particularized them in this notice of the anatomy of the Aurochs.

Measurements of the Trunk of the Aurochs.

	Inches.
Length of vertebral column from the atlas to the sixth caudal vertebra, measured across the diapophyses	81
Length of vertebral column over the neural spines	88
Length of cervical region over the diapophyses	17
Length of dorsal region ditto	30
Length of lumbar region ditto	13
Length of sacral and six caudal ditto	21
Depth of spine of seventh cervical	8
Depth of spine of first, second and third dorsal, being the three longest, each	11
Length of first rib	9
Length of ninth, or the longest	18½
Seven ribs articulate by separate hæmapophyses to the sternum.	
Length of diapophysis of fourth lumbar, or the longest . .	4½
Breadth of atlas across the neural arch	7
Extreme breadth across the spines of the ilia	14
Extreme breadth across the pubis, from the inner edge of each acetabulum	6

2. DESCRIPTION OF A NEW GENUS OF ACEPHALOUS MOLLUSCA, OF THE FAMILY PECTINACEA, COLLECTED BY CAPT. SIR EDWARD BELCHER DURING THE VOYAGE OF H.M.S. SAMARANG. BY ARTHUR ADAMS AND LOVELL REEVE, FF.L.S.

(Mollusca, pl. 1. fig. 2.)

[Enlarged to twice its natural diameter.]

GENUS HEMIPECTEN.

HEMIPECTEN FORBESIANUS. *Hem. testâ orbiculari, Anomiaformi, tenuissimâ, hyalind, concentricè lineatâ, linearum interstitiis eximie reticulatis; valvâ inferiore planulatâ, posticè auriculatâ, auriculâ longitudinaliter radiatâ, sinu infra profundo, margine opposito subtiliter denticulato; valvâ superiore convexâ, extus interdum decussatim rugosâ, vix auriculatâ; cardine edentulo, ligamento angusto, marginali, cartilagine parvo solido in cavitatem centalem superficiariam valvis ambabus ligamentum intersecante; pellucido-albâ, valvâ superiore interdum rufo-aurantio radiatâ.*

Hab. Sooloo Archipelago, Eastern Seas.

The subject of the foregoing description, which constitutes an extremely interesting discovery in the acephalous family *Pectinacea*, is an inequivalve shell, partaking of the characters of *Pecten* and *Ano-*

mia. Like *Anomia*, it is a thin, hyaline substance, of which the upper valve is a rude convex plate, distorted according to its situation of growth, but slightly notched on one side. Like *Pecten*, the under valve is characterised by a prominent auricle on the left side, the sinus beneath being very deeply cut in the direction of the hinge-margin, and furnished along the edge with a row of fine erect denticles. The hinge, similar to that of *Pecten*, consists of a slight marginal ligament intersected in the middle by a solid triangular cartilage, situated in the hollow of a superficial depression in each valve. Apparently the nearest approximation to this shell may be found in some of the fossil *Pectens* of the carboniferous limestone, distinguished by a nearer relation with *Anomia*, of which it presents a reversed condition of growth.

From the circumstance of one of the valves being perforated by a deep sinus, of which there is no corresponding growth in the other, it may be compared with *Pedum*, but there is no indication of the umbonal area which characterises the hinge of that genus, and it does not appear to be the production of an animal of the same peculiar habits.

In texture and composition the valves consist of a transparent, semipearlaceous lamina, exhibiting a series of closely-arranged concentric lines, the interstices between which are minutely rayed with much finer lines. If any importance can be attached to the variations in the microscopic structure of shells for the purposes of classification, the observations with which we have been kindly favoured by Dr. Carpenter on the genus, tend rather to show its affinity with *Pedum*. There is some uncertainty in the result. "The flat valve," says Dr. Carpenter, "in both specimens is permeated by copious tubuli, a character in which the species agrees with *Pedum* and with certain species of *Lima*, and differs from *Pecten*. This tubularity exists also in the convex valve of the colourless specimen, but is absent in the other (at least in the portion of it which the Bryozoon covering its surface allows me to examine), and I would direct your attention to the fact that the coloured shell possesses a rudimental sculpturing over the whole of its visible external surface, which is totally wanting in the other. Is not this sufficient as a specific difference?"

The two specimens here spoken of, collected during the voyage of the Samarang, were dredged by Captain Sir Edward Belcher in the Sooloo Sea, from a coral and stony bottom, at a depth of about fourteen fathoms. The under valve of each is smooth, showing it to have been attached; the upper valve, covered in part in both specimens with particles of coral and parasitic shells, is in one individual smooth and colourless, in the other decussately corrugated, delicately rayed with reddish-orange. The two shells so entirely agree in all other respects that we have not ventured to describe them as distinct species.

Trusting that this interesting subject may assist the developmental views of Professor Edward Forbes, we have the pleasure of distinguishing the species by his name.

November 28, 1848.

Professor Owen, Vice-President, in the Chair.

The following papers were read :—

1. DESCRIPTIONS OF SOME NEW SPECIES OF OVULUM IN THE COLLECTION OF MR. CUMING. BY G. B. SOWERBY, JUN.

1. OVULUM UMBILICATUM (Thes. Conch. pl. 101. f. 88, 89). *Ovul. testâ globosâ, subpyriforme, albâ, roseo pallidè tincto, dorso ad extremitates rubro lineato, ad terminum posticum umbilicato; aperturâ subapertâ; labio externo angustato umbilicato; aperturâ subapertâ; labio externo angustato intus crenulato posticè labium internum superante; labio interno posticè tumorem elevatum denticulatum ferente, ad canalem lineari, anticè bicostellatâ, ad canalem uniplicato.*

Agreeing with *O. margarita* in general appearance, but the outer lip is thinner, the mouth wider, the upper callosity elevated and denticulated. There is also a small umbilicus behind the posterior termination of the outer lip.

Hab. Ticao, Philippines; by Mr. Cuming.

2. OVULUM LANCEOLATUM (Thes. Conch. pl. 100. f. 35, 36). *Ovul. testâ elongatâ, angustatâ, minutissimè striatâ, aurantio-rubescente, seu albidâ, canalibus subproductis, emarginatis; aperturâ angustatâ; labio externo planulato crasso, breviusculo, anticè angulatim flexuoso; labio interno tumido rubro longitudinaliter marginato, posticè ad canalem producto, subtortuoso, anticè intus longitudinaliter sulcato, uniplicato, ad canalem angusto, rectiusculo, acuminato.*

A remarkable shell, presenting the appearance of *O. aciculare* very much lengthened. The aperture is narrow, excepting towards the anterior, where the outer lip is bent out: the under surface is flat, the inner lip edged with a reddish line. Collected by Mr. Cuming.

Hab. Sorsogon, Isle of Luzon, Philippines.

There is a white variety of this species (?) from Molucca.

3. OVULUM UNIPLICATUM (Thes. Conch. pl. 100. f. 30, 31, 32). *Ovul. testâ elongatâ, subcylindricâ, pellucidâ, minutissimè striatâ, aurantid, seu violaced, anticè subacuminatâ, posticè subrotundatâ; dorso margine distincto; aperturâ subapertâ; labio externo paululûm incrassato, ad extremitates recedente, anticè subangulato, ad canalem emarginato; labio interno intus subdepresso, posticè spiraliter uniplicato, ad canalem tortuo, versus labium externum deflecto, anticè subtortuo acuminato.*

Specimens of the pale violet variety were obtained by Mr. Cuming from near Charleston, South Carolina; a darker one from Rio Janeiro.

This species resembles *O. aciculare*, but is more acuminate at the anterior extremity; it is rather more ventricose, and finely striated. The spiral fold near the anterior canal is more decided and less oblique, and the edge of the canal above it invariably leans towards the outer lip.

4. OVULUM DEFLEXUM (Thes. Conch. pl. 100. f. 57, 58). *Ovul. testâ ovali-elongatâ, lævigatâ, albidâ, extremitatibus deflexis; aperturâ angustatâ; labio externo crasso, lato, complanato, anticè arcuato, breviusculo; labio interno longitudinaliter tumido, complanato, posticè uniplicato, anticè ad canalem acuminato.*

Resembling *O. aciculare*, but with a broad, flattened outer lip, and the extremities turned downwards. Brought from Ticao, Philippines, by Mr. Cuming.

5. OVULUM PHILIPPINARUM (Thes. Conch. pl. 100. f. 57, 58). *Ovul. testâ elongatâ, gradatim rostratâ lævigatâ, fulvâ, subtùs albidâ; aperturâ angustatâ, ad canales truncatâ; labio externo lævi, albo, rectiusculo, anticè angulatim contracto; labio interno lævi, intùs anticè subemarginato.*

The contraction towards the extremities is more gradual, and the outer lip straighter, than *O. birostre*, and the canals are truncated at the extremities. The colour is pale fawn, darkened in the aperture, and nearly white at the lips.

Several specimens were brought by Mr. Cuming from the island of Capul, Philippines.

6. OVULUM SUBROSTRATUM (Thes. Conch. pl. 100. f. 39, 40). *Ovul. testâ oblongâ, lævi, rubro-violascente, ad extremitates subproductâ, acuminatâ; dorso margine distincto; aperturâ angustatâ, anticè subangulatâ; labio externo lævi, ad extremitates recedente; labio interno tumido, intùs unicarinato, posticè spiraliter uniplicato, ad canales rectiusculo, producto.*

Resembling *O. secale*, but with the extremities more produced and straightened.

From Honduras Bay; collected by Mr. Dyson.

7. OVULUM SIMILE (Thes. Conch. pl. 100. f. 28, 29). *Ovul. testâ oblongâ, ovali, spiraliter striatâ, fulvâ; canalibus subproductis, emarginatis; labio externo crasso, lævi, anticè subarcuato, utrinque breviusculo; labio interno tumido, posticè spiraliter uniplicato, ad canalem subtortuo, acuminato, anticè subdepresso, intùs longitudinaliter unicarinato, ad canalem rectiusculo, acuminato.*

Mr. Cuming's collection; locality unknown.

Resembling *O. secale*, but spirally striated.

2. DESCRIPTIONS OF SOME NEW SPECIES OF CANCELLARIA IN THE COLLECTION OF MR. H. CUMING. BY G. B. SOWERBY, JUN.

1. CANCELLARIA UNDULATA (Thes. Conch. pl. 92. f. 12; pl. 95. f. 79). *Canc. testâ ovali, lineis undulatis paululùm elevatis cinctâ; costis crassiusculis subnoduliferis; anfractibus subangulatis; aperturâ internè striatâ; columellâ crassâ, granulôsâ; colore*

fulvo, fusco (præcipuè ad angulum anfractuum) interruptim fasciato.

Hab. Van Diemen's Land. Var. *truncata*, Philippines; H. Cuming.

This species was originally included in the *C. granosa*, Sowerby, Conch. Illustr., but the general aspect of the shell, especially the banded variety, is so different, owing to the greater fineness of the striæ, that on examining a number of specimens I think they may well be separated.

2. *CANCELLARIA TÆNIATA* (Thes. Conch. pl. 95. f. 75, 76). *Canc. testâ elongatâ, turrîtâ; costis numerosis, transversè striatis, ad angulum anfractuum acutè angulatis; spirâ acuminatâ, apice mammelliferâ; aperturâ internè lævigatâ; margine acuto; columellâ lævi, biplicatâ; colore pallidè fulvo, fusco tæniato.*

Hab. —? Mus. H. Cuming.

3. *CANCELLARIA MELANOSTOMA* (Thes. Conch. pl. 95. f. 78). *Canc. testâ ovali, longitudinaliter striis noduliferis et transversè striis alternatis minutè decussatâ; spirâ acuminatâ, anfractibus paucis, rotundatis; aperturâ ovali, magnâ, internè costatâ; labio externo denticulato; columellâ expansâ, anticè granulatâ, triplicatâ; colore pallidè fulvo, fusco latè fasciato; labio externo bimaculato, columellâ fusca nigricante.*

The smoothness of the decussating striæ, the more oval form, the peculiar dark colour and granulation of the columella, serve to distinguish this species from the preceding.

Mr. Cuming possesses the only specimen which we have seen. Its locality is unknown.

4. *CANCELLARIA EXCAVATA* (Thes. Conch. pl. 93. f. 18). *Canc. testâ ovatâ, lævi; spirâ acuminatâ, turrîtâ; anfractibus ad suturam profundè excavatis; aperturâ breviusculâ, angulatâ, labio externo lævi; internè costato; columellâ triplicatâ, umbilicatâ; colore nullo.*

Hab. South Australia.

It resembles *C. spirata*, but the aperture is shorter in proportion to the spire, and the upper part of the whorls more deeply excavated. The shell is umbilicated behind the columella, and of a white colour.

5. *CANCELLARIA FOVEOLATA* (Thes. Conch. pl. 103. f. 30, 31). *Canc. testâ oblongo-ovali, turrîtâ, lævigatâ, obsoletè striatâ; spirâ productâ, anfractibus angulatis, ad suturam excavatis, ad angulum subcoronatis; aperturâ triangulari, lævi; columellâ triplicatâ; umbilico mediocri; colore fusco, vel fulvo tæniato.*

From the sands in Algoa Bay. One specimen is of a uniform brown colour, and the other beautifully lineated.

6. *CANCELLARIA SEMIDISJUNCTA* (Thes. Conch. pl. 95. f. 62, 63). *Canc. testâ ovali, ventricosâ, turrîtâ, spiraliter sulcatâ; anfractibus angulatis, ad suturam profundè excavatis, ultimo disjuncto; umbilico maximo, costato; aperturâ triangulari, columellâ triplicatâ; colore fulvo, fusco longitudinaliter fasciato.*

No. CLXXXIX.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

A black and white photograph showing a close-up of a dark, heavily textured surface, likely a rock face or a piece of rough fabric. The texture is characterized by numerous small, irregular pits and protrusions. A small, light-colored, irregularly shaped object, possibly a piece of debris or a small animal, is perched on the upper right portion of the textured surface. The lighting is dramatic, with strong highlights and deep shadows, emphasizing the ruggedness of the material.

L. V. Hawzen's del. et lith.



MYCETUS PALLIATUS Gray.





HERPESTES OCHRACEUS Gray.



CINCLOSOMA CASTAHEOTHORAX. Gould.

darker tint; chin, throat and under part paler, not punctated; end of tail bright yellow, with an elongated black tip.

Hab. Abyssinia.

The hair of the back short, yellow, with a short blackish base and a narrow dark brown subterminal band; of the throat and under part of the body longer uniform pale yellow, with a short dark band at the base; of the lower half of the tail longer pale yellow, with three or four rather narrow, equidistant darker bands; of the end of the tail uniform bright yellow, and of the hinder end all black, forming a terminal tuft. Ears rather large, rounded, covered with short close-pressed hairs. The soles of the hind-feet bald to the heels.

The skull is rather elongate and narrow; the false grinders are 3-3, the first being very small and conical; the third are subtriangular, with a slight tubercle on the inner side: the orbit not quite complete, but with a short interruption in the middle of the hinder side.

Length of skull $2\frac{1}{2}$ inches, width $\frac{1}{2}$; length of palate $1\frac{1}{5}$ inch; of face from front of orbit $5\frac{1}{2}$ lines; of lower jaw 1 inch $3\frac{1}{2}$ lines.

5. DESCRIPTION OF A NEW SPECIES OF CINCLOSOMA.

By J. GOULD, Esq., F.R.S. ETC.

(Aves, pl. 6.)

CINCLOSOMA CASTANEOTHORAX, n. sp.

Sp. Ch.—Crown of the head, ear-coverts, back of the neck and upper tail-coverts brown; stripe over the eye and another from the base of the lower mandible, down the side of the neck, white; shoulders and wing-coverts black, each feather with a spot of white at the tip; all the upper surface, the outer margins of the scapularies, and a broad longitudinal stripe on their inner webs next the shaft, deep rust-red; primaries, secondaries, and the central portion of the scapularies dark brown; tail black, all but the two central feathers largely tipped with white; chin and throat black; chest crossed by a band of rich rust-red; sides of the chest and flanks brownish grey, the latter blotched with black; centre of the abdomen white; under tail-coverts brown, deepening into black near the tip, and margined with white; bill and feet black.

Total length, $8\frac{1}{2}$ inches; bill, 1; wing, 4; tail, $4\frac{1}{4}$; tarsi, 1.

Hab. Darling Downs, New South Wales.

Remark.—Nearly allied to *C. castanotus* and *C. cinnamomeum*, from which it is however easily distinguished by the colour of the chest and back.

DR. MACDONALD communicated orally his ideas on the Vertebral Homologies as applicable to Zoology, of which observations he has furnished the following abstract:—

“Dr. Macdonald gave a short sketch of the characters of the typical vertebra, as proposed by Professor Owen and several continental zoologists and comparative anatomists, and then contrasted it with one which had been the result of many years' study, and which he considered more in accordance with the vertebra and its auto-genous and exogenous elements as traceable in the endoskeleton of

the Vertebrate classes, and also as showing its analogy in the Annulose animals. The table which he exhibited points out these, from which it would appear that Dr. Macdonald considers the bodies of the vertebræ, as described by anthropotomists,—continued downwards through the sacrum and coccyx to the top of the tail, and the basilar process upwards to the sella turcica,—as so many portions or segments of a central axis formed around a centrochord,—and not a notochord as usually described,—from which the autogenous elements spring and radiate to the periphery, and, converging mesially along the dorsal aspect, enclose within the tunnel of the *Neuro-Camera* the whole cerebro-spinal axis, of varying dimensions in the different regions, and another set of radii meeting sternally, and forming the three thoracic regions, having a costal region interposed. The Rachidian development from the sella turcica to the tail, with its mesothorax and metathorax, is the longest, and forms the Rachal type; the anterior towards the nose—the facial or proboscidian—is the shorter, and has only one thorax, the cephalothorax, formed by the mandibular costæ and palatine sternum.

“This framework, like a large trunk, is enclosed by three cycloid or segmental zones:—

1. The *Temporal*, formed by the squamo-temporal, zygoma and malar bones, and supporting its membral or epicycloid *ramus*, formed by the maxilla.

2. The *Humeral* or scapular clavicle and manubrium sterni, with its *epicycloid ramus*, the brachium, cubit and carpodactyle portions.

3. The *Coxal* or ilio-pubic, with its epicycloid ramus, femur, crus and tarso-digital portions.

“In so extensive a subject Dr. Macdonald restricted his present communication to the consideration of a portion of the epicycloid ramus of the metathoracic or coxal zone, and pointed out the strong analogy which might be traced between the tarsus and the bones of the arm in the human skeleton, in order to facilitate the examination of the same organs in the lower classes, and more especially in the osseous fishes, where, from an early prejudice, resulting from what appears to Dr. Macdonald as the hasty observation of preceding observers, it has long been overlooked and considered as the homologue of the pectoral limb. This great error has rendered the whole subject confused and complicated, and has given rise to many of what Dr. Macdonald considers the extravagances of Geoffroy St. Hilaire and his followers in the French school, and constrained them to mistake the true respiratory or humeral epicycloid ramus, and superadd to this class the additional zone and membral ramus, under the vague idea of its being greatly developed tympanic bones; whereas, had they seen the analogy of the human tarsus and carpus, they never would have mistaken the tibia for the scapula or brachia, or the calcis for the ulna, and the scaphoid for the radius; and had they even examined the higher or cartilaginous fishes, they would have seen the opercular bones removed somewhat further down the trunk, and the pelvic or coxal zone and epicycloid ramus more distant. This would have led Professor Owen not to have considered the posterior extre-

mity or coxal zone and limb as the divergent appendages of the occipital vertebra. As to the homologies of these parts, the Doctor postponed the consideration of them till another opportunity, and proceeded simply with the tarsus. This consists in Man and many mammals of seven bones, which are arranged in two rows; each row has developed from it one or more digital phalanges when most developed; with the first row the thumb or great toe is developed, while the other toes having metatarsal and digital phalanges are connected with the anterior row or distal end of the tarsus, where the tarsal bones are fused or developed in a single bone. This is beautifully seen in many of the birds, especially the *Cursores* and *Grallatores*: in the *Apteryx*, as figured in the 'Zoological Transactions' by Prof. Owen, vol. iii. pl. 49, the tarsus is seen to consist of a single bone, terminating in three distinct knuckles, for the articulation with the metatarsal phalanges; while the thumb is seen with its different joints on the posterior and inner aspect, and in its natural position. This part of the leg has long been mistaken by ornithologists: Prof. Owen calls it tarso-metatarsal, and Dr. Melville views it as the metatarsal, which Dr. Macdonald asserts is surely more erroneous than even Prof. Owen's view.

"The thumb or great toe very often disappears in the endoskeleton, but may sometimes be seen in the exoskeleton, as in the leg of the Horse and some other mammals, where the metatarsus is fused into a single or shank-bone, terminating in a single phalanx as in the Horse, or double phalanx as in the Llama.

"Dr. Macdonald also briefly alluded to the nomenclature adopted by entomologists and other annulose zoologists, and maintained, that if the nomenclature of the anatomist was to be appropriated by them, they were bound to use the terms anatomically; and then submitted the following sketch of the homologies of the posterior leg:—

Coxa = Cotylon.

Trochanter = Femur.

Femur = Tibia.

Tibia = Tarsus and great toe.

Tarsus = Metatarsus and phalanges.

"These homologies are easily traceable in all the six legs of the Entomoid classes, and also in the thoracic legs of the Crustacea, and are particularly well marked in the large claw of the Crab, where the lines and markings point out the metatarsal and digital phalanges, terminating in the large claw; where the thumb or opposable claw is jointed to what may be viewed as homologous to the tarsus, while the rest is the fused terminal phalanges."

The communication was also accompanied with a verbal explanation of the several diagrams exhibited.

December 12, 1848.

R. C. Griffith, Esq., F.G.S., in the Chair.

The following papers were read to the Meeting :—

1. ON THE HABITS OF A LIVING SPECIMEN OF *NANINA VITRINOIDES* (DESH.). BY H. E. STRICKLAND, F.G.S.

(Mollusca, pl. 2.)

On the 2nd of December, 1847, Capt. W. J. E. Boys presented me with three specimens of a terrestrial mollusk, named *Nanina vitrinoides*, by Mr. Gray (P. Z. S. pt. 2. p. 58; *Helix vitrinoides*, Desh.). Capt. Boys had procured them a considerable time before, certainly not less than a year, in the district of Ajmeer in Upper India. The animals still remained within the shells, but from the length of time during which they had been kept dry they were greatly reduced in bulk, and had almost wholly retired from the outer volution, as was easily seen from the transparency of the shell. Like many of the *Helicidæ* of hot climates, especially those which are exposed to long intervals of drought, the *Nanina vitrinoides* secretes a calcareous *poma*, or deciduous operculum, every time that it retires into a state of torpor. The specimens in question had formed two or three successive *pomata*, one within the other, during the process of their desiccation.

In hopes of restoring their animation, I placed them upon some wet moss in a warm room. Two of them proved to be past recovery, but the animal of the third was seen through the transparent shell to be gradually enlarging in bulk by the absorption of moisture, and at the end of a week it finally reached the door of its dwelling, threw off the *poma*, and began to crawl. A morsel of boiled carrot was presented to it, which it greedily devoured, and speedily increased in health and vigour. I have now kept this interesting creature a twelvemonth, and have often been tempted to exclaim with Oken, "What majesty is in a creeping snail; what reflection, what earnestness, what timidity, and yet at the same time what confidence! Surely a snail is an exalted symbol of mind slumbering deeply within itself."

Since its revival my *Nanina* has greatly increased in size, and has added half a volution to its shell, which now measures $\frac{7}{10}$ inch in diameter. Its favourite food is boiled carrots and raw lettuce-leaves. It generally remains quiet during the day, but crawls forth and shows considerable activity in the evening, and has never shown any inclination to hibernate or become torpid for a lengthened period.

The shell of *Nanina vitrinoides* is brown, glossy and pellucid, and in shape and colour closely resembles the shells of the European genus *Zonites*, from which, without examination of the animal, it seems to be generically undistinguishable. The animal however is

very different, and is more allied to, though quite distinct from, that of the genus *Vitrina*. The foot, when contracted, is too large to be withdrawn into the shell, except after a considerable period of desiccation. When expanded, and at full stretch, the foot is remarkably long and narrow, measuring about two inches in length and $\frac{1}{2}$ inch in breadth (see figs. 1, 2). The hinder extremity is abruptly truncate, surmounted by a short horn-like appendage, similar to that in the larvæ of certain Lepidopterous genera. But the most peculiar character in the animal of *Nanina* is that of the two elongate pointed lobes or flaps which project from the margin of the mantle, one on each side of the mouth of the shell. These lobes possess a certain amount of lateral motion, and a considerable power of retraction and expansion, but are always kept in close contact with the surface of the shell (see fig. 1. *a*, *b*).

The animal is in the frequent habit of performing the following singular operation, which, as far as I am aware, has not before been noticed in any terrestrial mollusk. Crawling to the top of its prison (which consists of an inverted tumbler, with a small aperture for air), it suspends itself to the glass by the hinder half of the foot, and twists the anterior part round, so as to bring its lower surface into contact with the shell. By the great length and flexibility of the anterior half of the foot, it is enabled to twist in a variety of directions, and thus to crawl as it were over every part of its own shell in succession, the hind-part of the animal remaining all the while firmly attached to the surface of the glass (see fig. 2). During this operation the horns are partially contracted, and the mouth of the animal is applied closely to the shell, and is seen to be alternately expanded and contracted, as if in the act of suction. In fact the whole process closely resembles the action of a cat when licking its feet and body, and is performed with just the same appearance of systematic determination. The object of this operation is no doubt the same in both animals,—that of clearing their persons from extraneous matter, and producing that aspect of cleanliness and beauty which is one of the laws of organic nature in its normal state. Hence that brilliant gloss which distinguishes the shell of the mollusk here referred to.

It would be desirable to ascertain whether any analogous habit is possessed by the allied genera *Vitrina* and *Zonites*. The shells of the British species of *Zonites* (*Z. nitens*, *alliacea*, *cellaria*, &c.) closely resemble *Nanina vitrinoides* in form, colour, and glossiness of surface, and their brilliancy must apparently be due to some polishing action similar to that here described. On the other hand, it is difficult to understand how the animals of *Zonites* and *Vitrina*, whose foot is much broader and shorter than in *Nanina*, should be able to reach every part of their shell and to purify its surface.

The animal of *Nanina vitrinoides* is of a deep cinereous, the mantle yellowish, its lateral projecting lobes darker, the under surface of the foot pale grey, with a yellowish stripe along each side.

Fig. 1 is a lateral view of the animal crawling; *a* and *b*, the lobes of the mantle.

Fig. 2 is a side-view of the animal when in the act of cleaning its

shell; *a b*, the portion of the foot attached to the glass; *c*, the medial portion of the foot, twisted from a vertical to a prone position.

Fig. 3 the *poma*, or deciduous operculum.

2. DESCRIPTION OF TWO NEW SPECIES OF CRUSTACEA. BY ADAM WHITE, F.L.S., ASSISTANT ZOOL. DEPT. BRIT. MUS.

(Annulosa, pl. 6.)

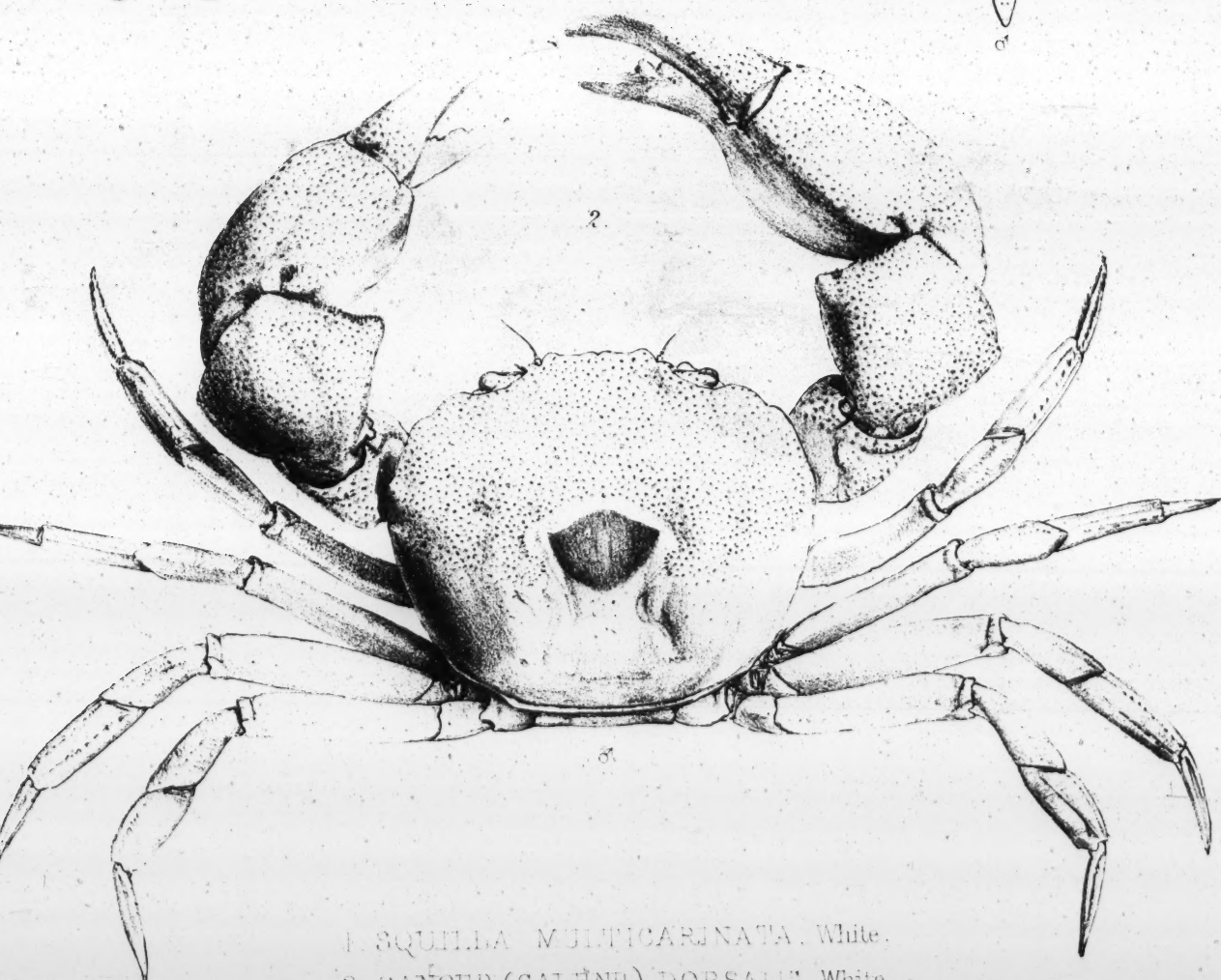
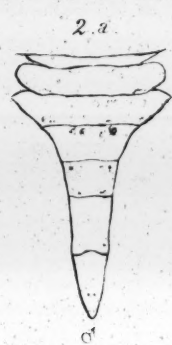
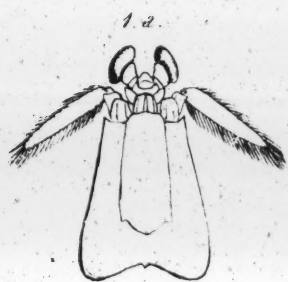
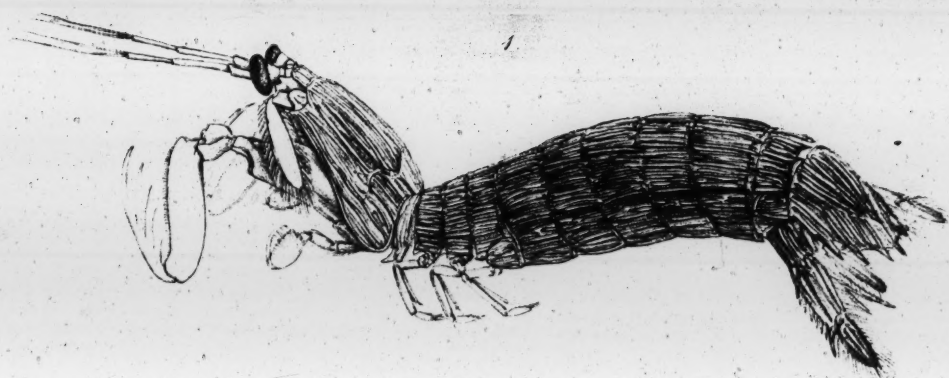
CANCER (GALENE) DORSALIS, White, n. s. *C. pallidè carneus hepatico-rubris punctulis confertim sparsus, thorace maculâ magnâ hepaticâ dorsali, mediâ, anticè angulatâ, posticè rotundatâ; thorace parte posticâ dimidiatâ immaculatâ; pedibus carneolo-suaviter variegatis; pedibus penultimis longissimis; chelis magnis, pallidis, supernè punctulis hepaticæ sparsis, subtus et infra immaculatis; fronte planâ, medio duobus tuberculis, thorace, lateribus anterioribus, tuberculis quatuor minime elevatis.*

This singularly pretty species was sent home by Mr. John MacGillivray, the naturalist attached to Capt. Stanley's expedition: its beautiful dotted surface, the large liver-coloured mark on the middle of its carapace, and the great length of the penultimate pair of legs, as well as its semi-nodose, semi-crenate, latero-anterior edge, well determine it.

SQUILLA MULTICARINATA, White, List of Crustacea Brit. Mus.

S. thorace, et segmentis abdominalibus, multis carinis, sæpè parallelis, carinâ singulâ, posticè productâ in spinam brevem; ordinibus duobus carinarum utriusque lateris, paulò majoribus.

This species comes in the second section of M. Edwards, and in his first subsection of it, in which the rostral plate does not cover the ophthalmic ring: the very numerous nearly parallel crests on each segment of carapace and abdomen, each crest produced slightly behind into a spine, at once indicate its distinctness from all *Squilla* with the description of which I am familiar. Two specimens were found in the Philippine Isles by Mr. Cuming (an indefatigable Fellow of this Society), and one, but a very small and badly-preserved one, was obtained on the voyage of H.M.S. Samarang, in Nangasaki Bay in the Eastern Seas.



1. *Squilla multicarinata*. White.
2. *Cancer (Galeus) dorsalis*. White.

Dr. Melville then communicated orally the first part of his paper "On the Ideal Vertebra." He commenced by defining this as "the most complete possible segment of the endo-skeleton," or in the words of his friend Mr. MacIise, "the plus vertebral quantity;" and it was illustrated by a diagram showing the body, neural arch and spine, and two concentric arches or circles below, the inner one consisting of three elements, to which he gave the names *hæmapophyses* and *hæmal spine*, and the outer one formed by the ribs and sternum.

He had arrived, he said, at this idea by observing the inner or true hæmal arch coexisting with the costo-sternal arch in many animals, and referred especially to the skeleton of a lizard in the British Museum as illustrating his discovery; and regretting that the laws of that Institution prevented his exhibiting it at the Meeting, he showed the hæmapophyses in enlarged diagrams of the cervical and dorsal vertebræ, and contrasted his ideal vertebra with diagrams of those given by Geoffroy St. Hilaire and Professor Owen. The bones, which Dr. Melville stated Sir P. Egerton had rediscovered in the *Ichthyosaurus*, and called 'wedge-bones,' were the true hæmapophyses, and he referred to a work by Camper, in which the cervical hæmapophyses had been previously described.

The bone which had been called the body of the atlas was the hæmapophysis of the occipital vertebra; and the 'odontoid process' was the true body of the atlas. The bones which Professor Müller had defined as the inferior transverse processes in fishes, and which Professor Owen had called 'parapophyses,' were the true hæmapophyses, and the term 'parapophyses' ought to be abolished, as it had been applied to several distinct elements. True hæmapophyses were sometimes autogenous, sometimes exogenous.

Adverting to the pleurapophyses or pleural elements of the vertebræ, Dr. Melville alluded to Müller and Thirles' discovery of these in the lumbar and sacral region, where they had been called 'transverse processes,' and he exhibited the sacral vertebra of an 'iguano-don,' showing the articular cavity for the sacral rib.

With regard to the exogenous processes of the vertebræ, which Professor Owen had called 'diapophyses,' Dr. Melville exhibited the vertebral columns of some quadrupeds, showing that they sent off a process backwards in the dorsal vertebræ, and were continued into the lumbar region by such posterior processes, and not by the processes which Professor Owen had called diapophyses in the lumbar region. Understanding that Professor Owen had proposed names for these mere subdivisions of the diapophyses, Dr. Melville strongly deprecated the overloading this difficult part of anatomy with unnecessary names. He also animadverted on Cuvier and M. De Blainville for having neglected to describe these modifications of the transverse processes. Dr. Melville pointed out in the vertebræ of an ant-eater and armadillo the processes which project forwards from the anterior zygapophyses, and which he believed Professor Owen called the 'epizygapophyses'—(the Professor here stated that he had given that name to the superior articular processes in serpents, which were not homologous with the processes alluded to by Dr. Melville,

and to which Professor Owen had assigned a distinct name). Dr. Melville went on to demonstrate these anteriorly projecting processes, and stated that the Edentata had no posterior or backwardly projecting processes from the diapophyses. With regard to the parts called 'parapophyses' by Professor Owen in the cranial vertebræ, Dr. Melville totally dissented from that author, and with regard to the 'paroccipital,' he stated that Rathké had proved it by tracing the development of the bones of the skull to be a mere dismemberment of the petrosal. After eulogising the labours of Müller, Rathké, Geoffroy, and other foreign authors, by whom the truths of that science—sneered at in this country as 'Philosophical Anatomy'—had been discovered and established, Dr. Melville awarded praise to Professor Owen for having first introduced them in a systematic form in an English work, the value of which however was lessened by many grave errors, which it was important to have corrected, and to effect which was the chief object of his present communication. The second part of this communication would be ready for the next Meeting.

The Chairman proposed a vote of thanks for Dr. Melville's paper on the Ideal Vertebra, and called upon Professor Owen to reply, when the Professor inquired whether Dr. Melville's paper had been received; and the Secretary having stated that the paper had not been received, as had been expected before the preparation of the *Agenda*, Professor Owen remarked that the absence of such a document, vouching for the precise nature and terms of Dr. Melville's present views, and the actual grounds of his objections, rendered him averse to entering upon a refutation of those that had just been urged *viva voce*. So far, however, as the author's views were represented by the diagrams exhibited, he thought it due to the Meeting to offer a few brief remarks on these.

Professor Owen then observed, that if the modification of the ideal vertebra now proposed had originated, as it might seem to those present who were unacquainted with his work 'On the Vertebrate Archetype,' from the discovery of new facts by Dr. Melville, of which Professor Owen had not had cognizance when he formed his conclusions on the nature of the typical vertebra, there might then have been a *prima facie* probability of his idea needing some modification in conformity with such alleged new facts. With the exception, however, of the coexistence in nature of a second hæmal arch internal to the costo-sternal arch, he had long been cognizant of the parts called by Dr. Melville 'hæmal arches' and 'hæmapophyses' in the cervical and dorsal regions of the species cited. Professor Owen then inquired whether the lizard at the British Museum referred to by Dr. Melville actually exhibited the perforated hæmal arch beneath the bodies of the cervical and dorsal vertebræ, as shown in the diagram, and Dr. Melville replied that it did not, but explained that the subvertebral processes in the trunk being serially homologous with the perforated hæmal arches in the tail, he was justified in introducing such arch along with the costo-sternal arch in the diagram.

Professor Owen then resumed, that the main question turned upon

a difference of interpretation of known facts, and stated that even had the structures adduced by Dr. Melville in support of his views been new, it would not therefore follow that his interpretation of them was the true one.

All those structures had, however, been described by Professor Owen, and duly considered by him prior to the publication of his work 'On the Archetype and Homologies of the Vertebrate Skeleton,' 8vo, Van Voorst, 1848, from which he quoted the following passages regarding their true nature and homologies. Viewing them as processes from the cortical part of the centrum, Professor Owen states: "The centrum may develop not only parapophyses, but inferior median exogenous processes, either single, like those of the cervical vertebræ of saurians and ophidians (which in *Deirodon scaber* perforate the œsophagus, are capped by dentine, and serve as teeth*), or double (atlas of *Sudis gigas*† and the lower cervical vertebræ of many birds); or the fibrous sheath of the notochord may develop a continuous plate of bone beneath two or more nuclei of centrams, formed by independent ossification in the body of the notochord, these nuclei being partially coherent to the peripheral or cortical plate." (p. 96.)

To this view Professor Owen had been led chiefly by the coexistence of these inferior exogenous processes in the anterior abdominal vertebræ of certain fishes with the true hæmal arches, the nature and modifications of which were so plainly demonstrated in the caudal region of fishes. Besides the species cited in which these 'processus inferiores' had been noticed by previous authors (Agassiz *e. g.* in the case of *Sudis gigas*), Professor Owen had discovered other modifications of the same nature, and referred to his description and figures of the confluent subvertebral processes in the anterior trunk-vertebræ of the *Bagrus tachypomus*, a large siluroid fish (Vertebrate Archetype, p. 92, pl. 1. fig. 3; Annals of Natural History, vol. xx. 1847, p. 217, fig. 1).

He had shown in his memoir on the so-called wedge-bones of the Enaliosauria, that the subvertebral processes in fishes were homologous with those autogenous wedge-bones, with the exogenous inferior processes of the cervical and dorsal vertebræ of ophidians and saurians, and with the body of the atlas in anthropotomy; and in his work on the Archetype, Professor Owen had summed up his views of their nature in the following words: "The continuous bony plate supporting those centrams was perforated lengthwise by the aorta, offering another mode of formation of a hæmal canal (*c h*), viz. by exogenous ossification in and from the lower part of the outer layer of the capsule of the notochord. The carotid hæmal canal in the necks of birds seems to be similarly formed; and the neck of the ichthyosaurus derives additional strength and fixation from apparently detached developments of bone in the lower part of the capsule of the notochord, at the inferior interspace between the occiput

* Jourdan, cited in Cuvier's Leçons d'Anat. Comparée, ed. 1835, p. 340, and Odontography, p. 179.

† Agassiz in Spix, Pisces Brasilienses, 4to, 1829, p. 6. tab. B. fig. 8.

and atlas, and at those of two or three succeeding cervical vertebræ*.

"The so-called 'body of the atlas' in recent saurians, birds, mammals and man, is the homologue of the first of these subvertebral wedge-bones, and represents only the inferior cortical part of such body. The odontoid process of the axis is the central and main part of the body of the atlas." (pp. 92, 93.)

But in fishes these subvertebral processes coexisted with the parapophyses in the same vertebræ (Archetype, pl. 1. fig. 4. pp. 3, 4, 5, 6, &c.), and likewise with the hæmal arches in the tail, with which Dr. Melville contended that they were serially homologous; in other words, the homotypes.

The caudal hæmal arches in fishes were, however, manifestly formed by other and true vertebral elements. Here Professor Owen explained by diagrammatic sketches the various ways in which the hæmal arch in the caudal vertebræ of fishes was formed, as he had described in his work. "The best marked general character of the vertebral column of the trunk in the class Pisces is that which Professor J. Müller first pointed out, viz. the formation of the hæmal arches in the tail by the gradual bending down and coalescence of the parapophyses; the exceptions being offered by the ganoid *Polypterus* and *Lepidosteus* and the protopterous *Lepidosiren*. The pleurapophyses are sometimes continued in ordinary osseous fishes from the parapophyses, after the transmutation of these into the hæmal arches. The dory, tunny and salmon yield this striking refutation of the idea of the formation of those arches in all fishes, by displaced, curtailed and approximated ribs. In some fishes, however (*e.g.* the cod), reduced pleurapophyses coalesce with the parapophyses to form the hæmal arches of the caudal vertebræ." (p. 90.)

"Thus the contracted hæmal arch in the caudal region of the body may be formed by different elements of the typical vertebra, *e.g.* by the parapophyses (fishes generally); by the pleurapophyses (*Lepidosiren*); by both parapophyses and pleurapophyses (*Sudis*, *Lepidosteus*); and by hæmapophyses, shortened and directly articulated with the centrums (reptiles and mammals)†." (p. 91.)

The last conclusion was that which was now called in question, or rather the sense in which Professor Owen here used the term *hæmapophyses* was altered by Dr. Melville to the signification which some anatomists expressed by the terms 'wedge-bones' and subvertebral processes, and which Professor Owen expresses by the term *hypapophyses*. Professor Owen had concluded that as the hæmal arches in the tail of fishes were formed by more or less of the modified elements of the more expanded hæmal or costal arches in the abdomen, the hæmal arches in the tail of batrachians, saurians and mammals were also formed by modifications of more or less of the expanded hæmal or sterno-costal arches of the trunk.

* Sir Philip de M. Grey Egerton in Geol. Trans. 2nd Ser. vol. v. p. 187, pl. 14.

† By a misconception of the sense in which Professor Owen uses the term 'hæmapophyses,' M. Agassiz has applied it to the laminae of the inferior or hæmal arches in fishes. (Recherches sur les Poiss. Foss. tom. i. p. 95.)

The coexistence of the subvertebral or inferior processes of the centrums (hypapophyses) with the true hæmal arches in fishes, proved that these arches could not be the homotypes of these processes in the tail any more than in the trunk; and a conclusion so established in fishes was good for batrachians, saurians and mammals. Arriving thus at the demonstration, that the hæmal arches in the tails of the air-breathing Vertebrata were formed like those in fishes, by a modification of the true hæmal arches of the trunk, the question remained to be decided, which of the elements of such arches were continued into the caudal region of reptiles, cetacea, &c. in order to constitute those arches; and Professor Owen had shown that the solution was given by the adult perennibranchiate batrachia and by the immature crocodiles, in which diapophyses and pleurapophyses coexisted with such hæmal arches in the tail: the laminæ of these arches therefore must be the hæmapophyses as defined in his diagrams of the typical vertebra, and consequently they must be the homotypes of those hæmapophyses which had received in the trunk the special names of 'ischia,' 'pubes,' 'abdominal ribs,' and 'sternal ribs.' But the sternal ribs coexisted in the same vertebra with the inferior exogenous processes from the centrum, to which processes Dr. Melville proposed to transfer Professor Owen's name of '*hæmapophyses*.' Professor Owen had, however, proposed a proper name for these commonly exogenous growths from the cortical part of the centrum, as he had likewise found himself reluctantly compelled to do for analogous exogenous processes from the neural arch, which were independent of and superadded to the ordinary 'diapophyses' and 'zygapophyses.' Professor Owen called the attention of Dr. Melville to a series of drawings in which he had proposed to illustrate his descriptions of these accessory processes, and alluded to his description of them in the Catalogue of the Royal College of Surgeons.

Professor Owen finally dissented from the definition of the ideal vertebra, which Dr. Melville had adopted from his friend Mr. Mac-lise.

Professor Owen considered that a typical structure might be departed from by excess as well as deficiency. As an example of such excess, he regarded those vertebræ which, in subserviency to muscular attachments, developed hypapophyses, anapophyses, metapophyses and diapophyses; or which in like adaptive subserviency to stronger union developed epizygapophyses, in addition to the ordinary præ- and post-zygapophyses; or which developed from the upper part of the centrum epi-apophyses, which in the cranial vertebræ had received the special denomination of clinoid processes, and were for the special protection of an appendage to the neural axis. In certain human crania these latter exogenous developments actually formed a secondary and minor neural arch internal to or concentric with the larger and normal neural arch; and Professor Owen drew a diagram of a section of such a vertebra, showing the small neural canal close above the centrum (basisphenoid) of the parietal vertebra, answering to, or homotypical with, the small hæmal canal formed by exogenous growths from the under part of the centrum (basi-occipital) of the

occipital vertebræ of the carp, and from the centrums of certain cervical vertebræ of fishes and birds, and which Dr. Melville had transferred to his diagram of a thoracic vertebra, and made it to consist of three distinct elements. Professor Owen stated that he had not presumed to depart wholly from nature, either by addition or subtraction, in the figures of the typical vertebræ, in his work (p. 81, fig. 14, p. 82, fig. 15) criticised by Dr. Melville; and that he knew of nothing in nature which corresponded with Dr. Melville's diagram, showing distinct hæmapophyses and a hæmal spine coexisting with vertebral ribs, sternal ribs, and sternum, in the same segment. On the principles on which Dr. Melville had constructed his ideal vertebra, viz. by the addition of mere adaptive processes of the centrum, exaggerated and artificially subdivided, to true and constant vertebral elements, such ideal vertebra might with a good reason be made symmetrical by the addition of a second concentric neural arch, as in Professor Owen's sketch of the human parietal vertebra, to the true expanded neural arch, and in his opinion such superadded internal neural arch might, with as good reason, be viewed as the true neurapophyses and neural spine, and had as good title to be diagrammatically represented as subdivided into those three separate elements, as the second internal hæmal arch, which Dr. Melville had superadded to his (Professor Owen's) figure of the second form of the typical vertebra (*On the Archetype, &c.*, p. 82, fig. 15). Such an 'ideal vertebra' would then truly exhibit what Dr. Melville had defined as "the most complete possible vertebra," and what Mr. Mac-lise called "the plus vertebral quantity."

Dr. Melville rejoined by reiterating his conviction that his 'ideal vertebra' was the true one, and would ultimately be accepted as such by all anatomists.

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